

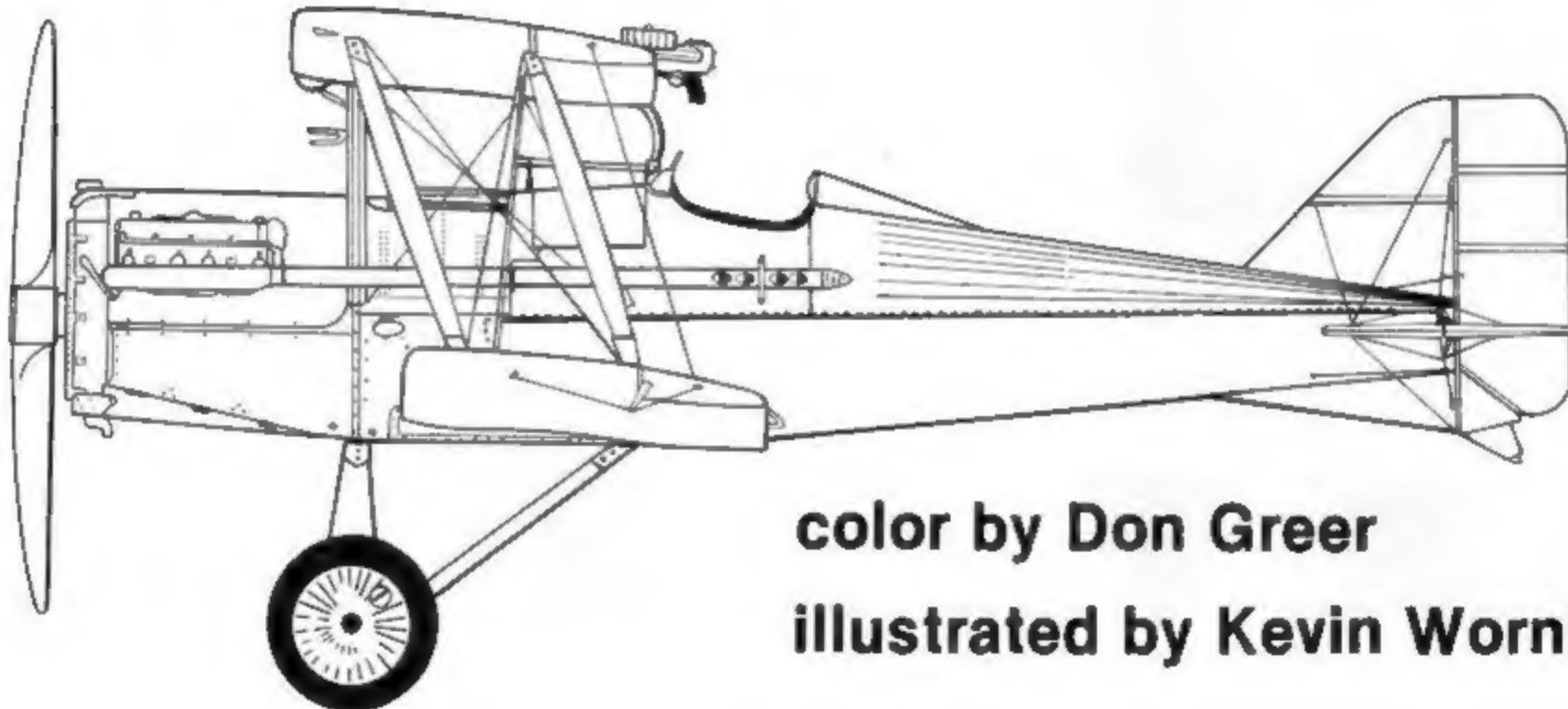
S.E.5a in Action



squadron/signal publications
Aircraft Number 69

S.E.5a in Action

by John F Connors



color by Don Greer
illustrated by Kevin Wornkey



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S.E.5a (C5430) V of No 56 Squadron at Elstree Blanche in June of 1917. Built by Vickers-Crayford and powered by a 200 hp Hispano-Suiza turning a four bladed propeller this machine was flown by Capt L W Jarvis.

Acknowledgements

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DEDICATION

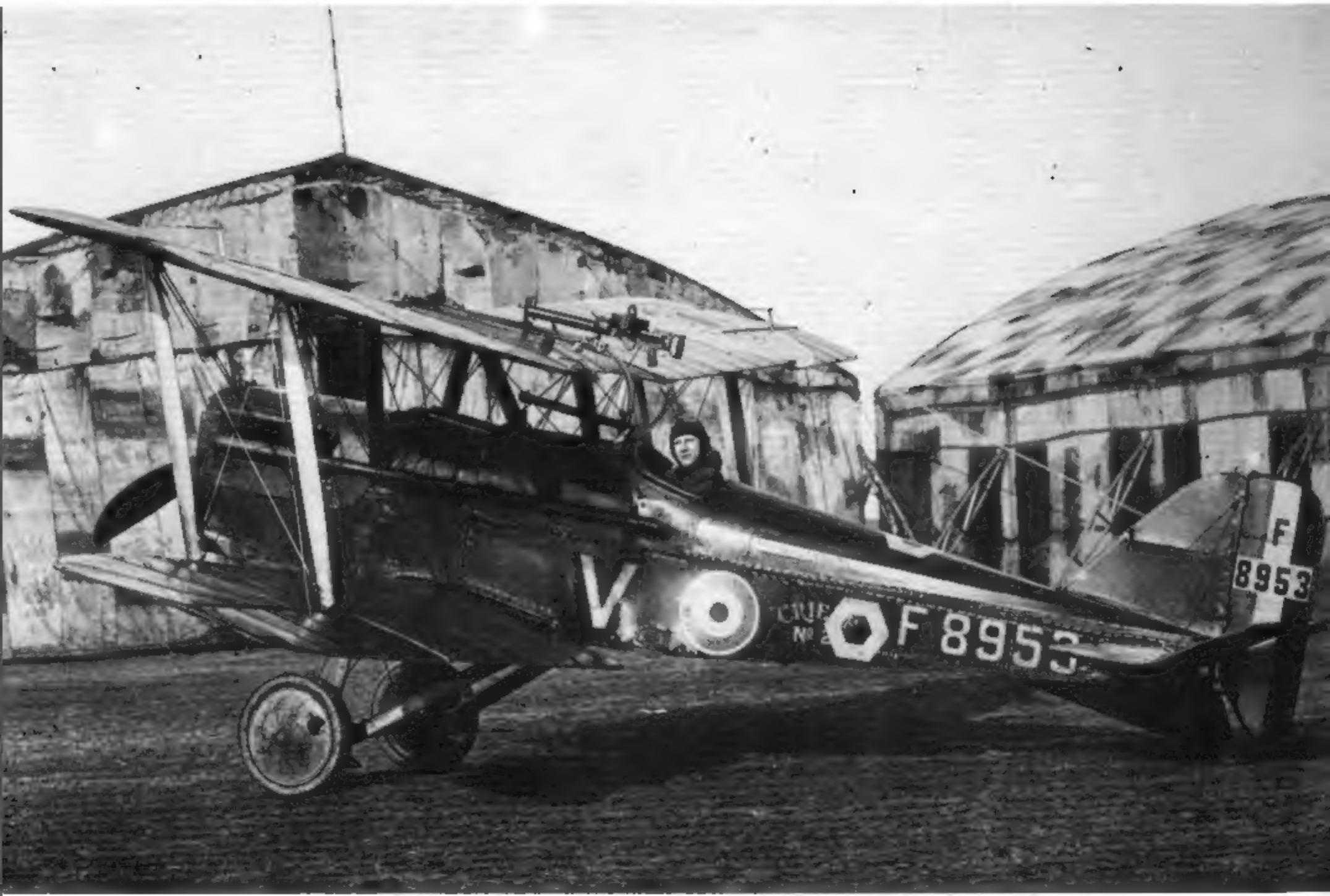
To Ron and Linda

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Lt Stuart C Elliot in his Vickers-Crayford built S.E.5a, F8953 (V), of No 85 Squadron. The White hexagon Squadron marking has been repeated on the upper decking of the fuselage, and the serial number is carried on both the rear fuselage and the rudder. A close examination of the upper wing reveals that the inside White circles of the roundels have been painted over to make the aircraft less visible from the air. This presentation aircraft carries the inscription 'Crieff No 2', proclaiming that this is the second aircraft paid for by the citizens of Crieff, Scotland through public subscription. (John R Carlson)



INTRODUCTION

The Royal Aircraft Factory S.E.5a, one of the best known combat airplanes of the First World War, was one of those rather typical British military aircraft, designed for functional instead of aesthetic purposes. Squarish and angular, it had none of the streamlined grace of the German Albatros nor the petite elegance of the French Nieuport. Viewed from the front the S.E.5 rather resembled a farm tractor with wings.

But, what the S.E.5 design lacked in aesthetics was more than made up for in performance. It was fast, capable of making or breaking combat at will. It was sturdy, able to absorb a good deal of punishment; and its pilots could enter a high speed dive with the confidence that the S.E.5's wings would stay on. The S.E.5 did not have the tight turning ability of its compatriot, the Sopwith F.1 Camel, but it was light on the controls, easy to fly, and provided an extremely steady gun platform.

Unfortunately, due to early structural problems and difficulties in finding a suitable engine, the S.E.5 design did not reach its full potential until fairly late in its career. But despite this, the aircraft established an enviable reputation for itself, and was flown with great success by some of the British Empire's most famous aces, including Mannock, McCudden, Bishop, Beauchamp-Proctor, and McElroy.

Prototype Development

The Hispano-Suiza V-8 engine was one of the best internal combustion engines of its day. Designed by the Swiss engineer Marc Birkigt and produced in Spain (hence the name Hispano-Suiza, or Spanish-Swiss) for use in high performance automobiles. Immediately after the outbreak of war in Europe during 1914, Birkigt began work on a version of the Hispano-Suiza engine for use in aircraft. The prototype of this engine, completed in February of 1915, weighed only 330 lbs and delivered 140 hp at 1400 rpm. In July of 1915 an example of the new engine was sent to France where, during tests at Bois-Colombes, it delivered 150 hp at 1550 rpm. The French were impressed and quickly made arrangements to produce the engine in France, where it was to be very successful as the power plant for the famous Spad fighter.

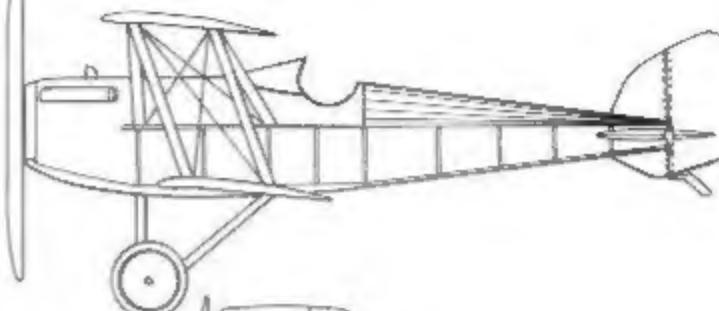
The British were also impressed with the possibilities offered by this amazingly powerful little engine. After Lt Col H R M Brooke-Popham of the Royal Flying Corps (RFC) had a chance to examine the original Hispano-Suiza engine sent to France, he recommended to the British Government that examples of the engine be purchased from the French while arrangements were being made for its manufacture in Great Britain. Accordingly, the British placed an order for fifty Hispano-Suisas from French firms. Deliveries, however, did not begin until a year later.

It was the original intention of the RFC to fit the Hispano-Suiza into the obsolescent B.E.2c observation aircraft, but the early, and brilliant, career of the Spad VII fighter in operational service demonstrated that the engine would be more appropriately put to use in a fighter. At the suggestion of Brigadier General Sefton Brancker the Royal Aircraft Factory at Farnborough was invited to design a single seat fighter around the Hispano-Suiza engine. According to one report (by Dr A P Thurston in 1921) such an aircraft was already on the drawing boards at Farnborough, designed by Capt Frank W Goodden, the Factory's chief test pilot. Whether this aircraft later became the S.E.5 has not been determined nor how much of the S.E.5's design (if any) can be attributed to Goodden. Whatever the case may be, the main responsibility for the development of the new design naturally fell upon H P Folland, head of the design department.

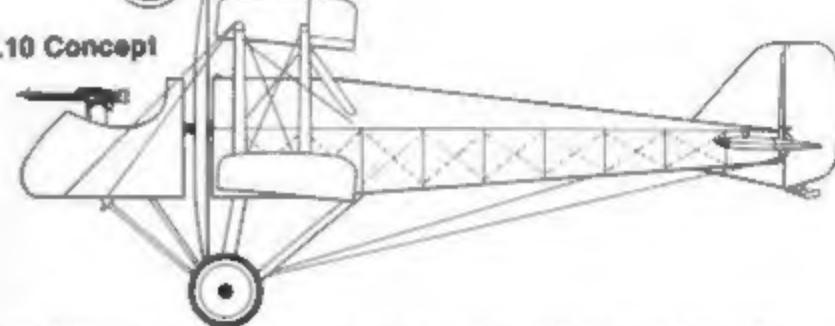
By the summer of 1916, the design staff at the Royal Aircraft Factory had completed drawings of two single seat aircraft around the Hispano-Suiza engine. One, called the F.E.10, was an unusual tractor biplane with the cockpit, mounting a flexible Lewis gun for armament, being located precariously in front of the engine and propeller. Not surprisingly, the F.E.10 offered little promise and did not proceed beyond the design stage. Its tail surfaces, however, would live on in its contemporary on the drawing boards, the S.E.5, which showed much greater potential.

The other aircraft design, designated S.E.5 (for Scout Experimental, Number 5), was also a tractor biplane, but with the cockpit located more conventionally behind the engine. It was extremely utilitarian in appearance, being designed with an eye toward ease of production and maintenance. Proposed armament was a single .303 Lewis gun

S.E.5 Concept



F.E.10 Concept



mounted internally and fired by means of a long blast tube through the hollow propeller shaft of a geared engine. Presumably, the purpose of this arrangement (and the unusual cockpit location of the defunct F.E.10 design) was to get around the problem of fitting a forward-firing weapon, even though the British had already pretty well solved this problem with the introduction of the Vickers-Challenger interrupter gear. A Bristol Scout (No 5313) had been sent to France equipped with such a device in March of 1916, and was followed by similarly equipped aircraft. Also, the first R.E.8 reconnaissance aircraft built by the Royal Aircraft Factory, which began to appear in September of 1916, were equipped with the Vickers-Challenger Interrupter gear.

The RFC was so impressed with the S.E.5 design, that they immediately placed an order for three prototypes and twenty-four production aircraft seven weeks before the first prototype was built and flown.

The first S.E.5 prototype, given the military serial number A4561, was completed and submitted for inspection on 20 November 1916. It was powered by a French built 150 hp Hispano-Suiza engine, driving a two bladed wooden propeller. Since this engine was a direct drive type, it was not possible to fit the internally mounted Lewis machine gun as planned. However, this method of armament is believed to have been abandoned by this time, due to the availability of the newly developed Constantinesco C.C. synchronization gear.

Construction of the S.E.5 was straight forward and entirely conventional for its day. The wings and tailplane were built around two spars and were framed entirely of spruce, with steel wire bracing. The control surfaces were framed of steel tubing with spruce ribs. All flight surfaces were fabric covered. The interplane struts were carved of solid spruce and set in steel attachment points. The cabane struts were steel tubing, faired with spruce, and wrapped in cloth tape.

The fuselage was also of spruce, consisting of four longerons with struts and cross members secured in steel fittings and diagonally braced with steel wire. The engine rested upon ash bearers supported by three spruce bulkheads, with cooling being provided by a one piece automobile type of radiator. The main fuel tank was mounted, exposed, atop the upper longerons, immediately behind the engine firewall. The fuselage upper decking, from just aft of the fuel tank to just aft of the cockpit, was of plywood veneer, with a semi-conical windscreens fitted to the front of the cockpit. The rear decking consisted of a series of plywood formers and spruce stringers. The entire fuselage was fabric covered except for the forward portion, which was covered with plywood with removable aluminum panels around the engine.

The landing gear was the typical V type, with struts of steel tubing. The one piece axle was enclosed in a streamlined airfoil and sprung with rubber shock cords covered with streamlined aluminum fairings. The tall skid consisted of two telescoping steel tubes with shock absorption provided by two coil springs, the whole assembly of which was encased in an aluminum fairing. The fuselage undercarriage, supporting the tall skid, was framed of steel tubing and fabric covered.

Test flights of A4561 began on 22 November with Frank W Goodden (who had been promoted to Major) at the controls. The following day Capt Albert Ball, Britain's leading ace at the time with thirty-two victories, made a ten minute flight in the aircraft, after which he decided he did not like it. His reasons are unclear, but may have had something to do with the fact that while home on leave, he had served as an adviser to the Austin Company in the development of a fighter aircraft known as the A.F.B.1. The actual role Ball played in the design of this aircraft has been a matter of much speculation, but it seems that all he did was to submit a list of design features. Whatever the case may be, Ball's negative comments on the S.E.5 may have been part of an attempt to cast a more favorable light on the Austin fighter, in which he had a personal interest.

After its initial test flights, additional modifications were made to A4561. An external gravity fuel tank was mounted atop the port upper wing center-section, the trailing edge cut-out was enlarged, side extensions were fitted to the windscreens, and exhaust manifolds with rear outlets replaced the original side-outlet type. A synchronized .303 Vickers machine gun was installed in the port fuselage upper decking just in front of the cockpit.

The first S.E.5 prototype (A4561) at Farnborough shortly after its completion is still equipped with the side-outlet exhaust manifolds and is unarmed. The aircraft was powered by a French built 160 hp Hispano-Suiza direct drive engine. (RAF Museum)



The second S.E.5 prototype (A4562) was completed and submitted one week after the first prototype, and was first flown on 4 December 1918. It too was powered by a 160 hp Hispano-Suiza, and was at first unarmed, but by 17 December it had been fitted with a fuselage mounted synchronized Vickers machine gun and an upper center wing mounted .303 Lewis machine gun on a Foster sliding rail mount. This wing mounted Lewis machine gun may have been inspired by the success which Ball and other aces had had with the Foster-mounted Lewis gun on the Nieuport 17.

With the armament of the S.E.5 being finalized, A4562 was flown to France on 24 December by Major Goodden for service trials, and comparisons with French fighters then being used by the British. At St Omer the S.E.5 was flown by two veteran RFC pilots, Lt Roderic M Hill of the Nieuport equipped No 60 Squadron, and Lt F H B Selous of No 19 Squadron, which was flying Spads. Both pilots commented quite favorably on the S.E.5's speed, strength, and ease of handling, with Selous being particularly impressed with the



(Above) A4561 after modifications with rear outlet exhausts, a gravity fuel tank atop the upper wing center section, and extensions to the windscreens. A synchronized .303 Vickers machine gun has been installed in the port fuselage upper decking just behind the engine. (John R Carlson)

(Below) The S.E.5 landing gear had a one piece axle enclosed in a streamlined airfoil and sprung with rubber shock cords, and was attached to the fuselage with V shaped struts of steel tubing. (John R Carlson)



forward and downward view from the cockpit. Hill remarked that while the S.E.5 lacked the maneuverability of the Nieuport, this was more than made up by the S.E.5's other fine characteristics.

Further modifications were made on A4562 while at St Omer. A Bowden cable for firing the Lewis gun and a new cocking lever for the Vickers were fitted, and racks for spare Lewis ammunition drums were installed in the cockpit. A modified tailplane actuating wheel was fitted. Recommendations were made that a throttle control lever be mounted on the control column, and that provisions be made for mounting wireless equipment. On 4 January 1917, A4562 was flown back to Farnborough by Lt Seious.

The third S.E.5 prototype (A4563) was completed by 17 January 1917, and flown by Major Goodden the same day. It was powered by a 200 hp geared Hispano-Suiza engine driving a larger diameter propeller than that fitted to the earlier prototypes. It had the same type of windscreen and exhaust manifolds as originally fitted to A4561.

On the morning of 28 January 1917, eight minutes into a routine test flight, A4562 crashed, killing Major Goodden. Eye-witnesses reported that the interplane struts had fallen away on one side, causing the wing cellule to collapse. Several theories were advanced for the cause of this crash; and since the drive wheel for the Constantinesco machine gun synchronization gear could not be found in the wreckage, it was thought that the gear had

flown out and hit one of the interplane struts. Another theory was that the propeller had disintegrated; and indeed this theory was accepted as the cause of the crash by a panel set up by the Royal Aircraft Factory to investigate the tragedy.

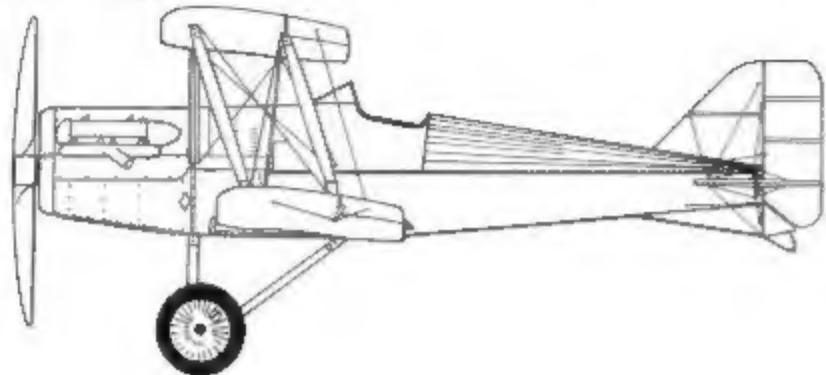
However, this view was not accepted by Dr A P Thurston of the Aeronautical Inspection Directorate (AID), who conducted his own extensive investigation into the cause of the crash. Thurston was able to collect enough pieces of the propeller from the crash site to nearly reassemble it, proving that it had been intact until the moment of impact. He instead found that failure of the compression ribs at both the front and rear strut attachment points had caused the struts to come loose during downward tension. The compression ribs, although strong enough in themselves, had no webbing between their upper and lower contours to absorb the torsion of the wings. In accordance with Dr Thurston's findings, the rib and strut fittings of the S.E.5 were strengthened, and stronger lift wires were installed. After this, the S.E.5 gave little cause for fear of structural failure.

The third S.E.5 prototype (A4563) in its original configuration was powered by a 200 hp geared Hispano-Suiza. The larger diameter propeller is apparent, as is the higher thrust line caused by the geared engine. Like A4561, this aircraft is fitted with a semi-conical windscreen, and was at first unarmed. (John R Carlson)



S.E.5 Developments

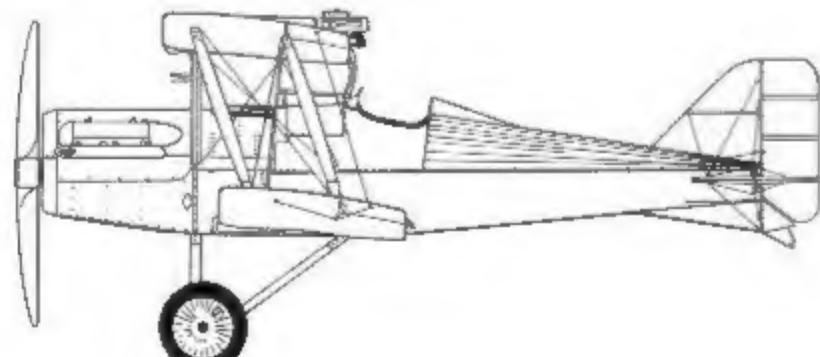
S.E.5 Prototype



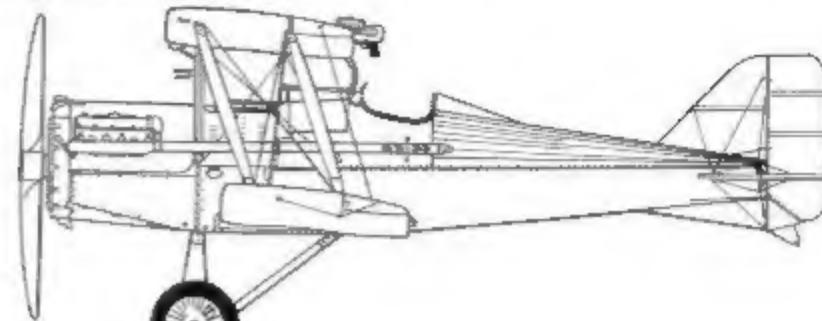
S.E.5 Early Production



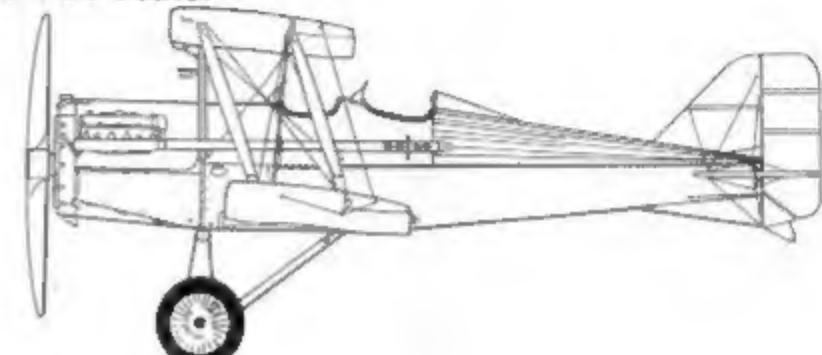
S.E.5 Late Production (Modified)



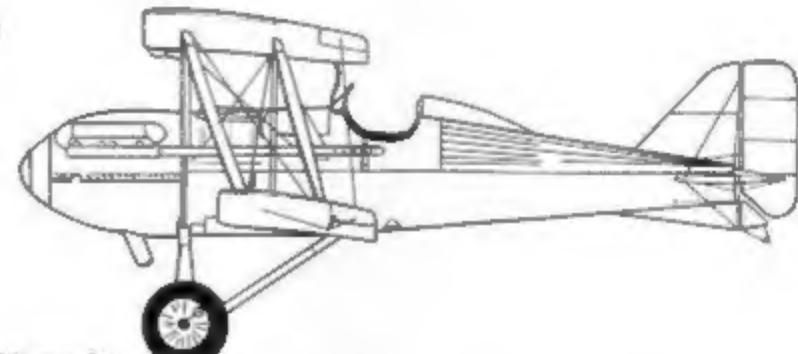
S.E.5a (Wolseley Viper)



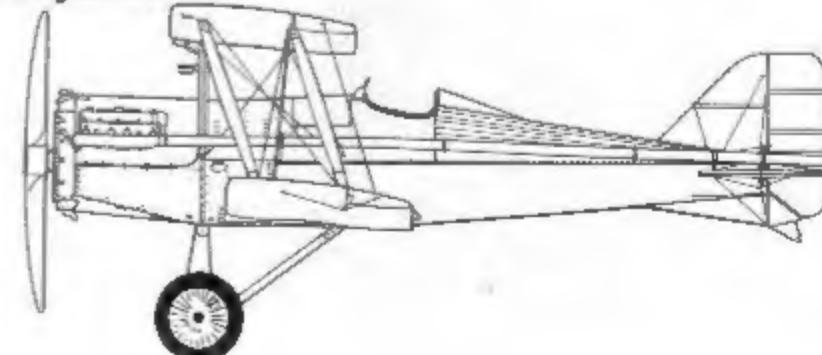
S.E.5a Two-Seater



S.E.5b



S.E.5 Skywriter



S.E.5

The first twenty-four production S.E.5s were serialled A4845-A4868 and were completed and delivered between 1 and 30 March 1917. The production aircraft differed from the prototypes in several ways. L-shaped exhaust manifolds, with outlets at the front, were fitted to the engine. And as recommended at St Omer, a throttle lever was mounted on the control column, and a compartment was built into the starboard side of the fuselage just behind the cockpit for the installation of wireless equipment (and while this compartment continued to be built into all subsequent S.E.5s, there is no record that a wireless was ever installed, even experimentally).

The most significant difference between these initial production S.E.5s and the prototypes was the mounting of a large paneled celluloid windscreens positioned well forward of the cockpit enclosing the breach of the Vickers machine gun, and giving the cockpit a semi-enclosed appearance. This greenhouse, as it was called, was very unpopular with the pilots; forward vision was inhibited by it, and in the event of a crash the pilot could seldom escape facial injury. The long tube of an Aldis gunsight fit into an aperture at the top of the windscreen.

Most of these initial production S.E.5s were assigned to No 56 Squadron, then being mobilized at London Colney under the command of Major R G Blomfield. Neither Blomfield nor his pilots were enthusiastic about the greenhouse windscreens, since they were obviously going to be a detriment to the pilots' efficiency. Brooke-Popham agreed, and in an official directive dated 8 April 1917 — the day after No 56 Squadron arrived in France — he virtually grounded the squadron until the large windscreens were removed and replaced with smaller windscreens.

Replacement of the windscreens was one of a list of modifications ordered by Brooke-Popham. He also ordered the armored seat be replaced with a wooden bench type of seat which was mounted lower in the cockpit, and that the slide of the Foster mount be extended in order to afford the pilot with the protection of the smaller windscreens while changing the Lewis ammunition drums.

On 14 April Major General Hugh Trenchard ordered that the Royal Aircraft Factory ex-

pedite the design and fitting of internal gravity fuel and water tanks into the upper wing center sections. In the meantime, pilots were instructed to remove the external wing tanks and fly without them.

At least two S.E.5s of No 56 Squadron were modified before the squadron left England. One was A4850, the aircraft assigned to Captain Albert Ball. Ball's intense dislike for the S.E.5 had not changed. He called it a *dud* and a *rotten machine*, claiming (with obvious exaggeration) that its speed was half that of the Nieuport and its rate of climb poorer. In fact the S.E.5 was faster than the Nieuport 17, with a speed of 119 mph at 6,500 ft, compared with 107 mph for the Nieuport at that altitude. The difference was even greater at 10,000 ft, where the S.E.5's speed was 114 mph compared to the Nieuport's 101 mph. The French fighter did have an advantage in rate of climb, taking five and a half minutes to reach 6,500 ft and nine minutes to reach 10,000 ft, while the S.E.5 took eight minutes, and fourteen and a quarter minutes respectively, to reach those altitudes.

Ball only grudgingly accepted the S.E.5, still hoping for official acceptance of the Austin A.F.B.1. *If Austin will not buck up and finish a machine for me, I shall have to go out on S.E.5s and do my best. I am getting one ready.*

The greenhouse on Ball's S.E.5 (A4850) was removed and replaced with a smaller Avro type of windscreens, with the forward cockpit decking being modified accordingly. A small headrest was fitted to the rear of the cockpit, and the seat was mounted lower in the cockpit. A new upper wing center section was constructed with an internal gravity fuel tank and a larger trailing edge cut-out. Ball also had the fuselage mounted Vickers gun removed, ostensibly to save weight, and the standard fuselage fuel tank was replaced with fuel tank of slightly larger capacity. Ball soon added a second Lewis gun, mounted to fire downward through the cockpit floor. The impracticality of this arrangement was obvious to everyone but Ball, and on 10 April, he was specifically ordered by Brooke-Popham to remove the downward firing Lewis and restore the Vickers. The Vickers gun on Ball's

S.E.5s of No 56 Squadron at London Colney, the first Royal Flying Corps (RFC) Squadron to receive the new aircraft. Albert Ball's modified S.E.5 (A4850) is third from the right. (RAF Museum)



aircraft was remounted in a slightly higher position than standard, since the non-standard fuselage fuel tank on Ball's aircraft did not contain the trough for the Vickers barrel. Eventually Ball had A4850 fitted with the long exhaust pipes from a Spad VII.

The other S.E.5 to be modified at London Colney was Captain Ian H D Henderson's aircraft (A4853). Like Ball's machine, it was fitted with an Avro windscreens and a new fuselage decking, but had a larger and more crude headrest fairing. This headrest was fitted to A4853 before the greenhouse was replaced.

H Greenly, a draftsman from the Royal Aircraft Factory, was sent to London Colney to make drawings of the changes made on the modified S.E.5s. It was too late to include these modifications on production S.E.5s, since the second production batch was already nearing completion. However, S.E.5s continued to be modified in the field, resulting in slight differences between individual aircraft in their top decking, styles of windscreens, and headrests.

The first combat patrol of the S.E.5 took place on 22 April 1917, when Ball led four other pilots of No 56 Squadron on a mission near the front lines. Since the S.E.5 was still a new and secret aircraft, the pilots were ordered to stay within two miles of their own lines and *not cross the front lines under any circumstances*. Ball attacked an Albatros two seater between Lievin and Croisilles and fired three 97 round Lewis drums from 150 yards. The German aircraft dived to the safety of its own lines. Ball, mindful of his orders, did not pursue.

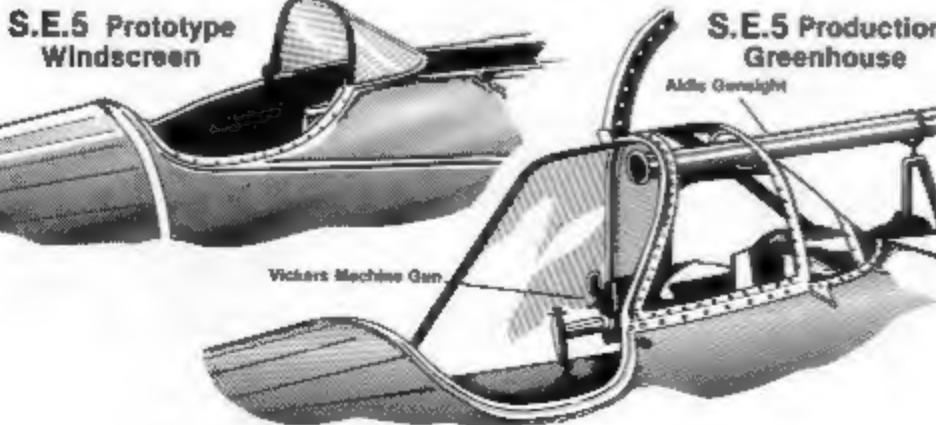
Four days later, Ball scored the first S.E.5 victory while flying A4850 when he shot down two German aircraft. He described the incident in his combat report:

S.E.5 A4850 on patrol, Lens to Arras, at a height of 13,000 feet saw FE.A coming from Cambrai. Number of H.A. observed getting off ground somewhere east of Cambrai until H.A. were about 8,000 feet, and dived at nearest H.A. firing a drum of Lewis and about fifty rounds of Vickers at the same time at a range of about twenty yards. H.A. went down quite out of control, and crashed in wood northeast of Cambrai.

S.E.5 A4850 turned in order to return to the lines, but by this time about five H.A. had got round on the west side. S.E.5 A4850 fired Vickers and tried to get through, but could not, so turned southeast. H.A. followed one getting far in advance of the others. S.E.5 A4850 turned on this, diving, and firing Lewis and all round Vickers until right up to H.A. H.A. burst into flames on right side and crashed.

The remainder of H.A. followed, firing, and got a few hits on S.E.5 A4850. S.E.5 A4850 fired two remaining drums Lewis at nearest H.A., which was a single-seater Scout with very long tail and sharp nose. This went down, but was all O.K. S.E.5 A4850 continued southeast until dusk, after which H.A. had all left.

After this combat, Ball's opinion of the S.E.5 improved and he seemed at last reconciled to the new aircraft. On 28 April A4850 was badly damaged by anti-aircraft fire, but owing to the strength of the S.E.5, Ball managed to return safely to base. Flying A8896 while A4850 was being repaired, Ball gained his forty-fourth, and last victory on 4 May.



On the evening of 7 May 1917, S.E.5s of No 56 Squadron, led by Ball in the now repaired A4850, took off into a gray sky for an offensive patrol north of Cambrai. Over the Cambrai-Douai Road, they were engaged by four Albatros D.IIs of the crack Jasta 11. The ensuing dogfight was a confusing affair, fought in a darkening sky of heavy clouds. Very early in the fight, Lt Roger Chaworth-Musters, flying S.E.5 A4857, fatally crashed beside the Arras to Henin-Lietard Road.

Ball was last seen by his comrades fighting with an Albatros when he disappeared into the overcast. Sometime later, he crashed to his death near Annouélin, behind the German lines.

When pulled from the wreckage, Ball's body showed no sign of bullet wounds. Eyewitnesses who saw the crash reported that Ball's S.E.5 came out of the clouds at what might have been a gliding angle, but that the aircraft was upside down. It has been theorized that Ball had become disoriented in the cloud cover and could not pull out of his glide in time after he broke out of the low clouds upside down. The Germans buried him the following day with full military honors.

In addition to No 56 Squadron, three other Royal Flying Corps squadrons were equipped with the S.E.5, Nos 24, 40 and 60 Squadrons. Many of the aircraft used by these units were obtained second hand, being passed from No 56 Squadron which was briefly transferred back to England for Home Defense duties in June of 1917. It was with No 60 Squadron that Canada's William A Bishop was introduced to the S.E.5, flying both A8930 and A8936. He gained his first S.E.5 victory on 28 July 1917 by shooting down an Albatros near Drocourt.

(Below) The large 'greenhouse' windscreens were fitted to the production S.E.5 in order to provide access to the Vickers ammunition breech in order to facilitate clearing ammunition jams in the gun. The .303 Lewis machine gun was mounted on a Foster rail so the gun could be slid down to change the drum ammunition magazine. (John R Carleton)





(Above) Lt Roger M Chaworth-Musters was killed in action on 7 May 1917, during the same combat in which Captain Albert Ball lost his life.

(Below) Lt Cecil A Lewis beside A4885. Lewis attained eight victories during the war and was awarded the Military Cross. His book, *Sagittarius Rising* about his experiences as a fighter pilot has become a classic of WWI aviation literature.

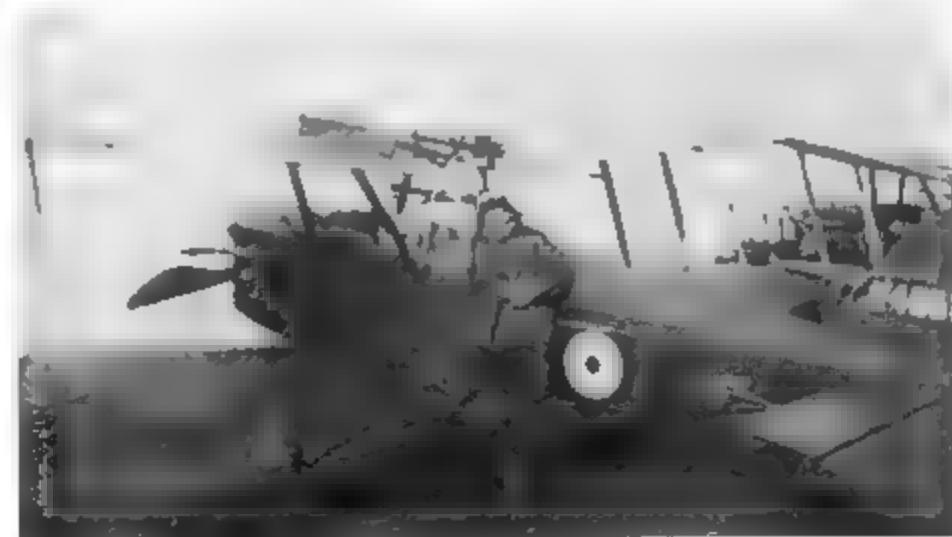


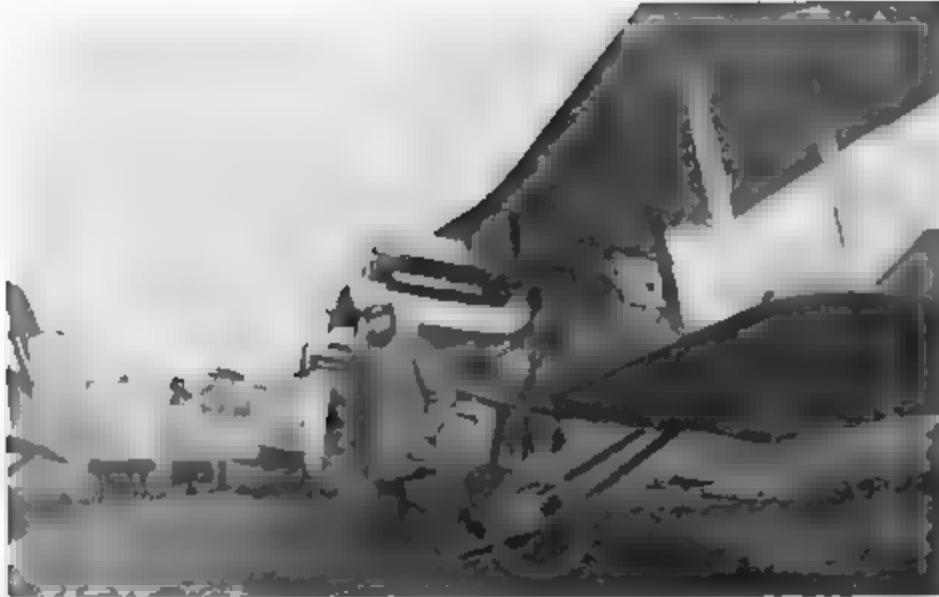
Pilots of No 56 Squadron pose with their S.E.5s just prior to taking off for France on 7 April 1917. Since Aviators in World War I had to supply their own overcoats for flight duty a great variety of flying apparel was seen.



(Above) Lt Gerald J C Maxwell survived the Great War with twenty-seven victories. Maxwell served two tours of combat duty with No 56 Squadron, in between which he served as an Instructor at the School of Aerial Fighting at Turnberry. During WWII, he was an RAF station commander.

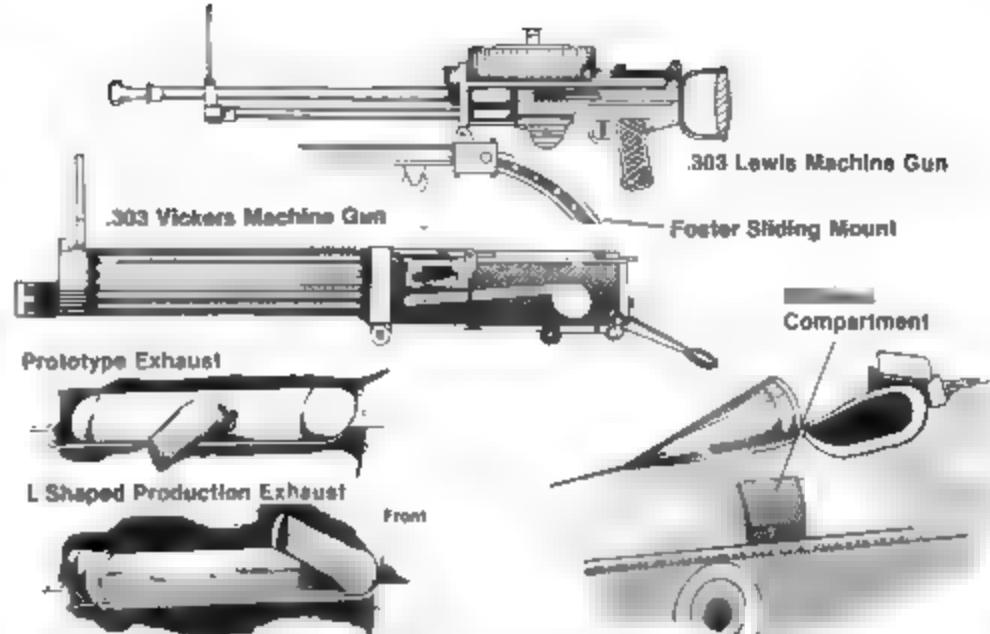
(Below) Lt W B Melville beside S.E.5 A4852. The long tube at the top of the 'greenhouse' is the Aldis gunsight that fit through an aperture in the top of the windscreen.





(Above) Lieutenant C R W Knight in front of his S.E.5. In the background is Albert Ball sitting in his now modified A4850.

(Below) Captain E L Foot sitting in his S.E.5 demonstrates the high seating position of the pilot in relation to the large windscreen. The potential for serious facial injury in the event of a crash is obvious, as is the limited visibility afforded by the windscreen. The synchronized Vickers machine gun, however, is right in front of the pilot making it very easy to clear if jammed. (RAF)



(Below) Ball sitting in the lowered pilot's seat of A4850 talking to Major Blomfield, his commanding officer. A small headrest has been fitted to the rear decking. The lower end of the Foster side mount rail has been secured with two bracing wires. (John R Carlson)

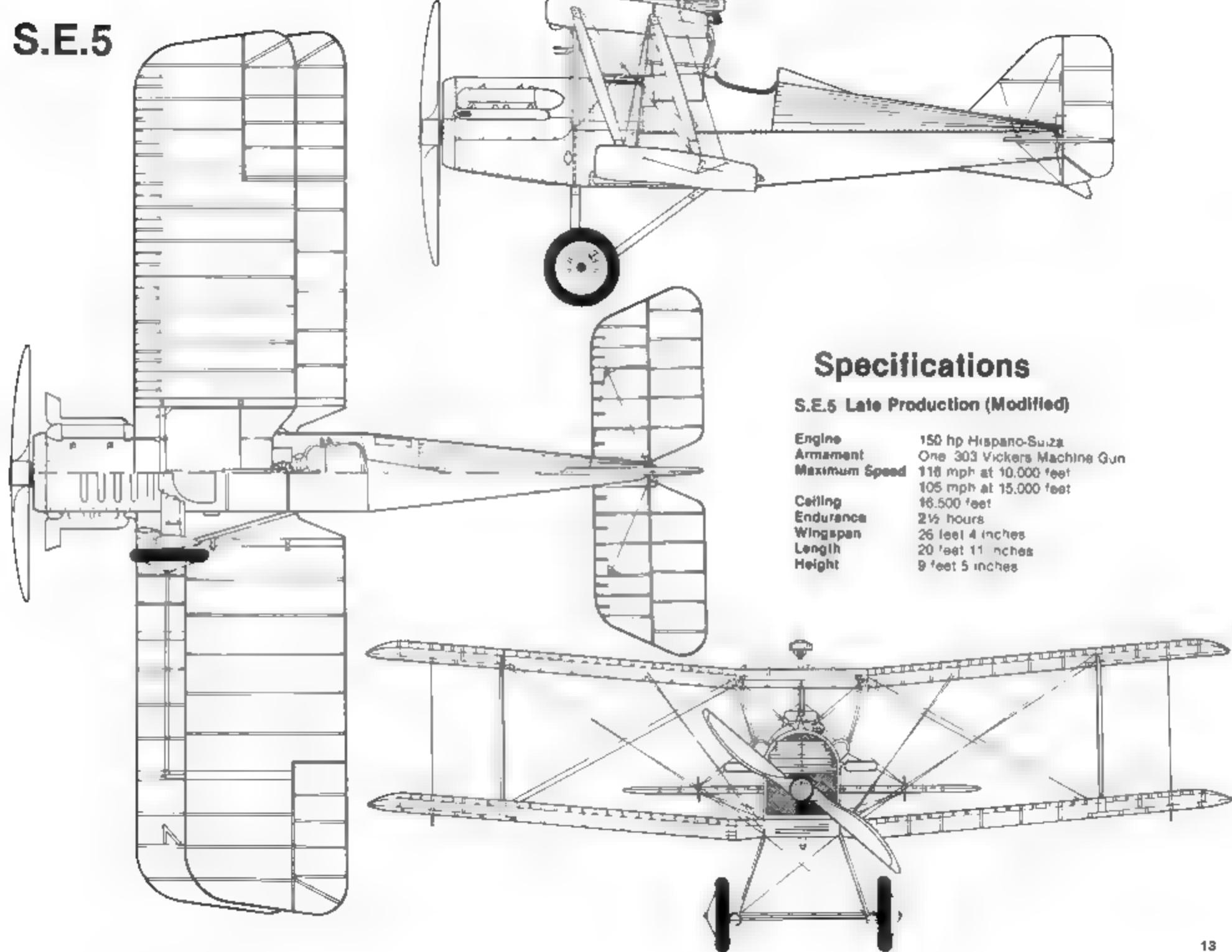




Captain Albert Ball in his much modified S.E.5 (A4850). His seat has been lowered, allowing him to sit much lower in the cockpit. The large 'greenhouse' has been removed and replaced with a small windscreen, and the fuselage top decking where the windscreen exposed the Vickers has been recovered. An internal gravity fuel tank has been fitted into a

rebuilt upper wing center section. Ball has also had smaller 700 x 75mm tires fitted to his aircraft, replacing the standard 700x100mm type. The muzzle of the downward firing Lewis gun that Ball had mounted internally can just be seen protruding from beneath the fuselage. (John R Carlson)

S.E.5



Specifications

S.E.5 Late Production (Modified)

Engine	150 hp Hispano-Suiza
Armament	One .303 Vickers Machine Gun
Maximum Speed	118 mph at 10,000 feet 105 mph at 15,000 feet
Ceiling	16,500 feet
Endurance	2½ hours
Wingspan	26 feet 4 inches
Length	20 feet 11 inches
Height	9 feet 5 inches



(Above) A line up of No 68 Squadron's aircraft includes Captain Henderson's aircraft (A4853), second from left, which has acquired a headrest, but still has the large windscreen. The fuselage roundels have small white outlines while the wing roundels do not. (RAF Museum)

(Below) Captain Henderson's aircraft (A4853), the other S.E.5 to be modified at London Colney before No 68 Squadron went to France. It has a larger but cruder, headrest fairing than that fitted to Ball's aircraft, a smaller windscreen has been fitted and the decking in front of the windscreen has been rebuilt, but the external wing-mounted gravity tank has been retained. (John R Carlson)



(Below) Originally assigned to Capt Ian H D Henderson, A4853 was being flown by Lt Lewis during the engagement in which Ball was killed. (John R Carlson)



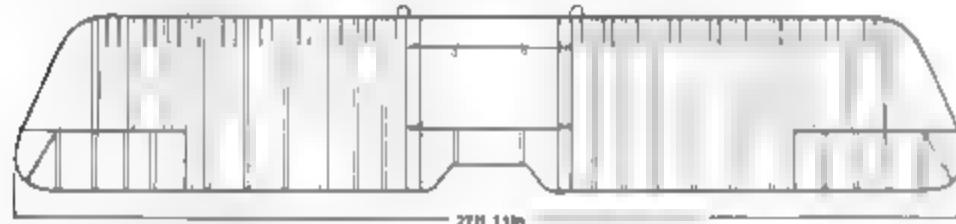
S.E.5. (Late Production)

In March of 1917 a Preliminary Performance Report by the official testing unit at Martlesham Heath was made on A4845, the first production S.E.5, which stated that lateral control was insufficient especially at low speeds hence the machine maneuvered poorly and was almost uncontrollable below 70 mph in gusts, causing a crash on take off. The report further suggested that aileron control be geared higher. As a result of this report aircraft of the second S.E.5 production batch were modified by having wings of a shorter span (26 ft 4 in) and wing tips with much less rake which provided additional aileron control at lower speeds. The second production batch of S.E.5s were also fitted with horizontal shutters on the upper portion of the radiator.

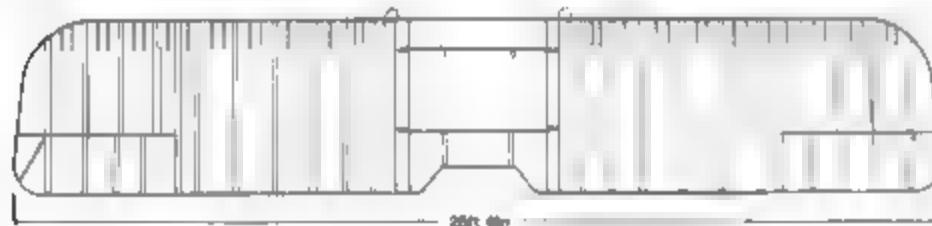
Forty-seven S.E.5s were completed in the second production batch, all by the Royal Aircraft Factory, although the last seven machines were powered by 200 hp engines and were regarded as early S.E.5as. The type remained in service until at least the end of 1917 while gradually being replaced by its more successful development, the S.E.5a.

Wing Span

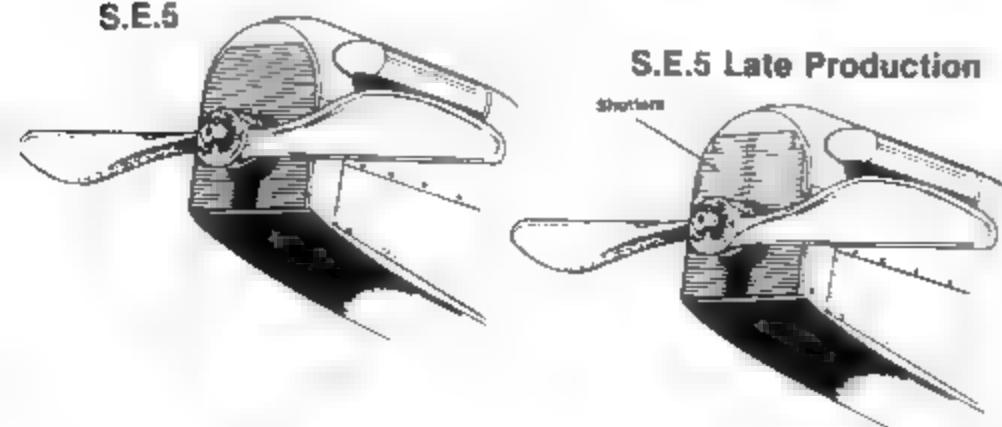
S.E.5



S.E.5 Late Production



S.E.5



(Above) A8904, the seventh aircraft of the second S.E.5 production batch. This aircraft was assigned to No 66 Squadron and was sent to France on 30 April 1917. Its first patrol was on 6 May, and the following day was flown by Lt K J Knaggs during Ball's last patrol. Transferred to No 2 A.S.D. on 19 May. It was assigned to No 80 Squadron in September. By February of 1918, it was assigned to No 1 Squadron, by which time it is believed to have been modified to S.E.5a standards. It was struck off RFC service rolls on 26 March 1918. (John R Carlson)

(Below) Also of the second production batch, A8817 has the shorter, blunter wing tips and horizontal shutters on the upper half of the radiator. This S.E.5 was one of two ordered by the RFC without armament, presumably to be used in the training role. (John R Carlson)





(Above) A8898 was the first aircraft of the second S.E.5 production batch, and was originally assigned to No 58 Squadron. It was flown by Ball when he gained his last victory on 4 May 1917, while his usual machine (A4850) was being repaired from anti-aircraft fire it had taken on 28 April. A8898 was later transferred to No 60 Squadron, in whose markings

it is seen. The nose was Red with a White outline, as was the fuselage stripe. The personal marking of a Green fern leaf on a White triangle was painted on the tail fin. The wheel covers were also Red, and the fuselage roundel is slightly larger than usual. (John R Carlson)



(Left) The S.E.5 flown by Captain William A Bishop while a member of No 60 Squadron. This aircraft is believed to be serialled A8936. The color scheme is similar to that of A8898, but with a Blue nose and fuselage stripe instead of Red. Bishop's aircraft also carried a blue tail fin outlined in white. These flamboyant markings were employed only briefly by No 60 Squadron as a means of flight identification — Red for A flight, Blue for B flight. Such colorful schemes were rare on British aircraft, and were officially frowned upon. Bishop's S.E.5 has also been modified around the cockpit area, and the windscreen appears to be of a different type than that usually seen on S.E.5s. Like A8898, it has been fitted with long exhaust pipes. (John R Carlson)



Aldis Gun Sight

S.E.5a

By late May of 1917, the third S.E.5 prototype (A4563) had become the prototype of the S.E.5a. When it arrived at Martlesham Heath on the 29th of May it was powered by a French built 200 hp Hispano-Suiza (Serial 7208 - a different engine than that originally fitted) driving a four bladed propeller. It had been fitted with the reduced wingspan and low rake wings of the late production S.E.5, and the externally mounted gravity fuel tank was replaced with an internal fuel tank mounted inside the upper wing center section beside the radiator header tank. The decking in front of the cockpit was deepened and a small windscreen fitted. The throttle lever mounted on the control column, having proven virtually useless in service, was removed. The radiator was fitted with two sets of vertical shutters. A4563 still retained the curved nose under fairing and L shaped exhaust manifolds of the S.E.5.

Tests of A4563 with the 200 hp Hispano-Suiza engine proved to be very satisfactory. It could climb to 14,000 feet in 16 minutes, and top speed at that altitude was 123 mph. The best comparable performance for the S.E.5 was 27 minutes, 6 seconds, to 15,000 feet, and 105 mph at that height.

The test flight report No M 105a also made the following remarks and suggestions:

- (a) The lateral control is better than that of the original 150 hp S.E.5.
- (b) The wind screen has been cut down to a normal size, and consequently the view, especially for landing, has been improved.
- (c) The Vickers Gun is not easy to get at. The lock can only be taken out by unhinging a portion of the cowling above the gun.
- (d) The cowling round the radiator came adrift during flight fouling and breaking the propeller. New cowling was fitted before the machine went to France, but is not considered satisfactory.
- (e) Radiator water cooling satisfactory. The engine did not overheat although the trials were carried out on a warm day. The radiator shutters are well designed and efficient.
- (f) The oil cooling is considered insufficient.

The data given in this report are taken from the results of one trial only, and therefore must be regarded as approximate only. It is considered that a better rate of climb can be obtained at low heights by climbing at a higher airspeed. The rates of climb above 10,000 feet are probably fairly accurate. The speeds are somewhat doubtful, but should not be more than 2 m.p.h. out.

The Royal Aircraft Factory did not wait for official approval of the S.E.5a; it had already begun production of the Improved model at Farnborough. Of the second production batch of forty-seven aircraft, only forty were completed as S.E.5as being powered by 150 hp Wolseley built Hispano-Suizas (one aircraft, A8914, was powered by a French built engine), and the remaining seven aircraft of the batch being powered by 200 hp Hispano-Suizas, and were therefore considered to be the first S.E.5as.

These last seven aircraft of the second S.E.5 production batch completed as S.E.5as were powered by 200 hp Hispano-Suiza engines built by either Wolseley or Peugeot. In addition, from 11 July 1917, all S.E.5 fuselages rebuilt by the No 2 Aircraft Repair Depot were converted to take the 200 hp engine, thus bringing them up to S.E.5a standards.

In February of 1917 contracts for license production of S.E.5 aircraft had been awarded

to Martinsyde Ltd, Brooklands, and Vickers Ltd, Weybridge, for 200 aircraft each. These aircraft were completed as S.E.5as, as were all subsequent S.E.5 airframes built by the Royal Aircraft Factory and eight sub-contractors. A total of 5,638 S.E.5as were ordered from the following companies:

Royal Aircraft Factory, Farnborough (213 aircraft ordered)
Austin Motor Company, Ltd, Northfield, Birmingham (1550)
Air Navigation Company, Ltd, Adderstone (360)
Martinsyde Ltd, Brooklands (800)
Vickers Ltd, Crayford (715)
Vickers Ltd, Weybridge (1450)
Whitehead Aircraft Ltd, Richmond (100)
Wolseley Motors Ltd, Birmingham (650)

The above totals represent the number of aircraft ordered, not the number produced, since many contracts were cancelled with the coming of the Armistice. Also, one contract for 200 aircraft placed with Graham-White Aviation Company Ltd, Hendon, was transferred to Wolseley.

Production S.E.5as were essentially similar to A4563, except for the addition of long exhaust pipes, a straight top line on the headrest fairing, and a straight profile to the nose under fairing, which gave the nose a distinctly square appearance.

No 56 Squadron, which returned to France on 5 July 1917 after an uneventful Home Defense tour, was again the first recipient of the new aircraft receiving its first S.E.5as in June. The only criticism leveled at the aircraft concerned the landing gear which consisted of the same size tube struts fitted to the earlier S.E.5. It was not sturdy enough to support the weight of the 200 hp engine, and on rough landings the struts tended to fail near the axle. Therefore, later S.E.5as were fitted with stronger forward undercarriage struts, the front legs of which consisted of two steel tube struts faired with plywood. Some pilots of No 58 Squadron further modified their S.E.5as by fitting shortened exhaust pipes to the engine and bunged sides to the cockpit providing more shoulder room.

A4563, the third S.E.5 prototype, became the prototype of the S.E.5a, seen at Martlesham Heath in May of 1917. And although it retains the L-shaped exhaust manifolds of the S.E.5, the cockpit area has been modified and a small windscreen and headrest fitted. The 200 hp Hispano-Suiza drives a four bladed propeller, however the under nose fairing retains the curved profile of the S.E.5. (Air Force Museum)

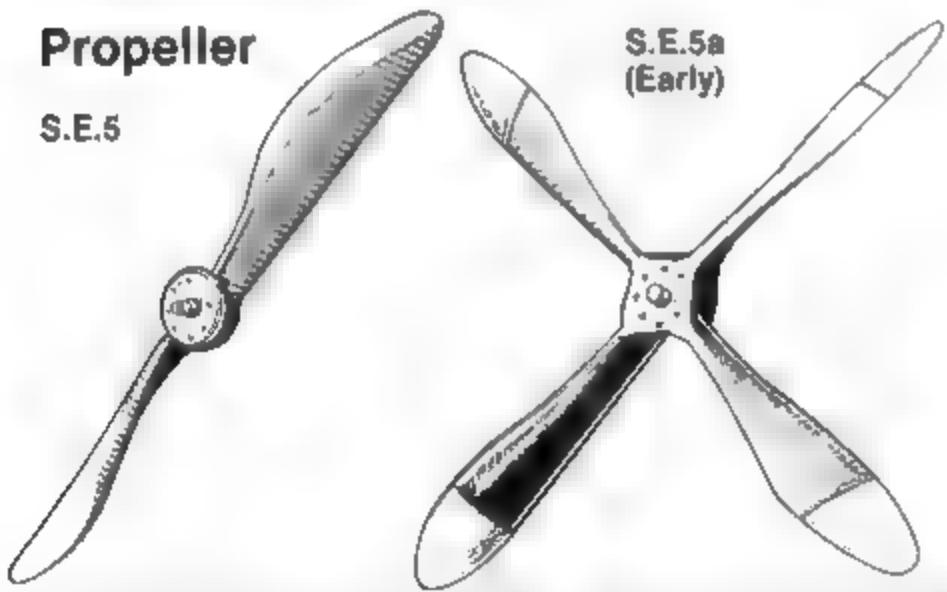




(Above) A very early production S.E.5a, the four bladed propeller was fitted to many early S.E.5as. Vertical shutters have been fitted to the radiator, and the early, weaker, landing gear struts are carried. (John R Carlson)

Propeller

S.E.5

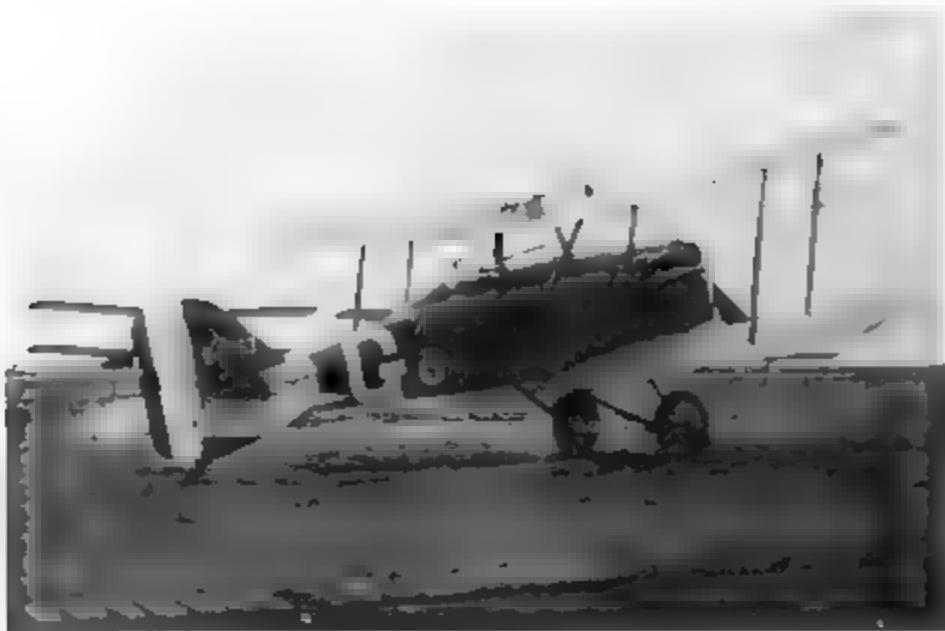


(Right) No 56 Squadron, which had been the first unit to receive the S.E.5, was also the first recipient of the S.E.5a, the first examples of which arrived on 9 June 1917. The large white individual identity letters carried on the fuselage sides were carried on the starboard surfaces of the upper wing in White, and in Black on the port undersurface of the lower wing inboard of the roundel. The eighteen inch White stripe around the rear fuselage was the unit marking of No 56 Squadron until March of 1918. (RAF Museum)



(Above) Lt Franklin sits in C5303 (X), the third Vickers-Crayford built S.E.5a, which was delivered to No 56 Squadron on 30 August 1917. Note the rather long pistol grip handle on the Lewis gun. The Lewis gun is mounted on an extended Foster slide that is attached to the top of the smaller windscreen. (RAF Museum)

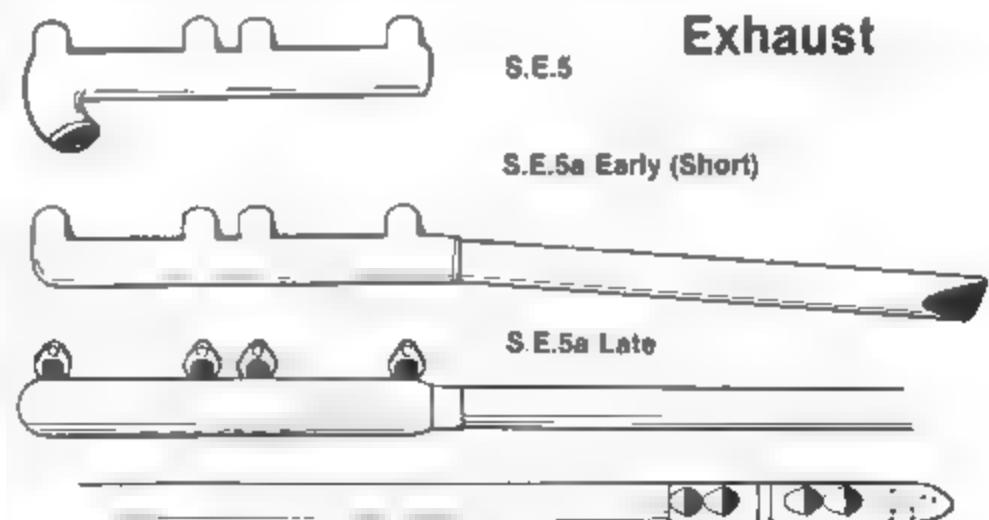




(Above) One of the most famous of all S.E.5a aces was Captain James B McCudden, seen in what may be his most famous aircraft, the Royal Aircraft Factory built B4883 (G). McCudden gained several of his fifty-seven victories while flying this S.E.5a. A number of No 56 Squadron S.E.5as were modified with shortened exhaust pipes and bulged cockpit sides. (RAF Museum)



(Above) Lt M E Mealing, M.C., a twelve victory ace, is seated in B595 (W), one of the first production batch S.E.5as built by Vickers-Weybridge and delivered on 5 July 1917. The Lewis gun on this aircraft is fitted with a long pistol grip. (RAF Museum)



(Left) This S.E.5a of No 56 Squadron is seen taxiing at Elstree Blanche. The pilot is believed to be Captain V P Cronyn. This aircraft is equipped with the shortened exhaust pipes. (RAF Museum)

Engine and Structural Problems

Throughout the summer and into the fall of 1917, production of the S.E.5a increased rapidly. By the end of the year 1,300 aircraft had been ordered, but only some 800 had been completed. Only five Squadrons, Nos 40, 41, 56, 60 and 84 Squadrons had been equipped with the S.E.5a, with two other units — Nos 24 and 68 — in the process of re-equipping with the new fighter by December of 1917. The reason for this delay was due to problems encountered with deliveries of the 200 hp Hispano-Suiza engines. Poor production facilities, late delivery schedules, and lack of what today would be termed adequate quality control, all contributed to a severe shortage of engines for the S.E.5a airframes rolling off the assembly lines.

A year earlier, in November of 1916, the British Admiralty foresaw the possibility of such an engine shortage, convinced the British Air Board to order 8,000 Hispano-Suizas from French contractors mostly from the firm of Emile Mayen. Unfortunately deliveries against this order did not begin until early 1918; the engine was in great demand in France, and since French aircraft came first, everyone else had to wait. As a result, any available engine, regardless of quality, was being installed into the waiting S.E.5a airframes, with the argument that a bad engine was better than none at all. This included some Hispano-Suiza engines built by the French Brasier firm which were no better than rejects, having poorly built reduction gears and imperfectly hardened propeller shafts. Engine failure in the S.E.5a became chronic.

A British engine, the Sunbeam Arab was tried in the S.E.5a as a substitute for the Hispano-Suiza, but with disappointing results. Of similar design and size as the Hispano-Suiza, the Arab vibrated too much to be suitable for the S.E.5a. Unfortunately, the Arab was ordered into production before being fully tested and its faults ironed out.

Wolseley Motors Ltd. of Birmingham held the contract for manufacturing the Hispano-Suiza in Britain. The Wolseley version of the Hispano-Suiza engine, known as the Adder differed from the French version by having a higher induction system and different reduction and compression gear ratios. Unfortunately the Adder also proved a disappointment as a powerplant for the S.E.5a, due to lubrication problems and crankshaft failures. Also the Adder's gears had five different reduction ratios, various crank pin lengths, and gear housing diameters, making spares a problem and maintenance a nightmare.

Wolseley had also received an order for four hundred 150 hp Hispano-Suizas, in case of failure of the 200 hp Wolseley version. It was apparently not made clear to Wolseley that it was the 150 hp version that they were to produce so its engineers instead created an engine based on the 200 hp Hispano-Suiza 8A, a direct engine. This new power plant, called the Viper, was to prove the solution to the S.E.5a's engine problems. For as a direct drive engine the Viper had no troublesome gears.

In August of 1917, an S.E.5a (B4862) was fitted with a Viper engine and tested at Martlesham Heath the following month. A second Viper installation was made in B4899 and tested in December. Performance of the S.E.5a with the Viper showed little significant improvement over the Hispano-Suiza powered versions, with a slight increase in rate of climb and a seven mph increase in speed. RFC officials were impressed with the Viper and it was ordered as the standard power plant of the S.E.5a. Unfortunately, the engine did not become available in large numbers until well into 1918, and until then the manufacturers of S.E.5as, and the pilots who flew them, had to make do with whatever engines were available. The fulfillment of the Admiralty's French order however prevented a real crisis from developing.

Viper powered S.E.5as differed from the Hispano-Suiza versions by having twin radiator cores, enclosed in a revised cowling with two sets of horizontal shutters and an even more squatish top, and the cylinder head fairings were eliminated. On later Viper powered S.E.5as, the Foster gun mount was fitted directly onto the upper wing surface eliminating the streamlined blocks made necessary by the higher thrust line of the geared Hispano-Suiza engine for the line of fire from the Lewis gun to clear the propeller arc of the earlier engine.

In addition to the problems of finding engines, the early operational career of the S.E.5a



(Above) The 47th production S.E.5a, Built by the Royal Aircraft Factory, B4897 was one of the first to feature the stronger undercarriage. In order to prevent gear failure during rough landings, the front single steel tube struts were replaced with struts having two steel tubes faired with wood.

(Below) Cranking up a Hispano-Suiza powered S.E.5a was best done with more than one man, as seen here. A man standing on the far side of the aircraft provides the optical illusion that the man in the cockpit has pushed his feet through the bottom of the aircraft and is standing on the ground! This aircraft is unarmed, indicating that it is being used by a training unit. (John R Carlson)



was marred by failure of the main planes during steep, high speed dives. Lt Selous of No 60 Squadron was killed on 4 January 1918, when C5334 broke up in the air. Another pilot of No. 41 Squadron was killed when the wings of his S.E.5a failed on 3 February.

A conference was held at Farnborough on 11 February to find a solution for these wing failures. The meeting produced the following list of modifications to be built into S.E.5a wings:

1. Stiffening of the ribs behind the rear spar.
2. Strengthening of the compression ribs.
3. Lengthening the front spar of the box rib by the aileron cut-out.
4. Omission of the stiffening of the rear spar for at least six inches of the box rib length.

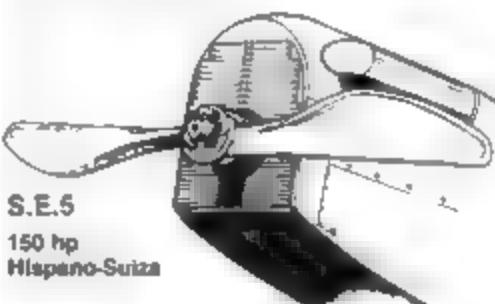
After these modifications were made, the S.E.5a never again gave its pilots cause for concern. Indeed, even with these early wing failures the S.E.5a gained a respectable reputation for robustness.

(Below) S.E.5a (B4885), built by the Royal Aircraft Factory, featured the early landing gear struts but was equipped with a two-bladed propeller. This aircraft at one time was experimentally fitted with two Lewis guns mounted on twin Foster slides atop the upper wing. Originally assigned to No 56 Squadron, the aircraft was later transferred to No 60 Squadron by which time the standard single gun Lewis arrangement had been re-installed. On 6 January 1918 B4885 was forced down intact in neutral Dutch territory. It was refurbished and used by the Dutch Air Service, in whose markings it is seen here. Its Dutch serial number was S.E.214. (John R Carlson)



(Above) E6967, a Viper powered S.E.5a built by the Air Navigation Company Ltd. Trusses are being used to support the tail, holding the aircraft in flight position, but have been erased from the negative — a common, but unexplained, practice during WWI. (John R Carlson)

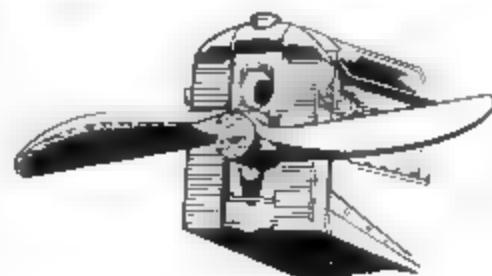
Radiators



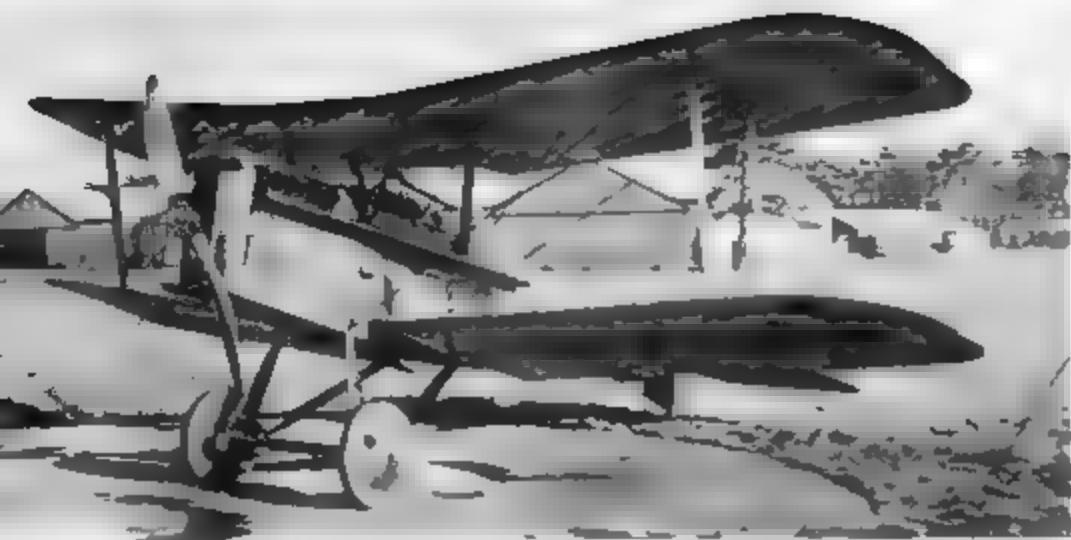
S.E.5
150 hp
Hispano-Suiza



S.E.5a Early
200 hp (Geared)
Hispano-Suiza



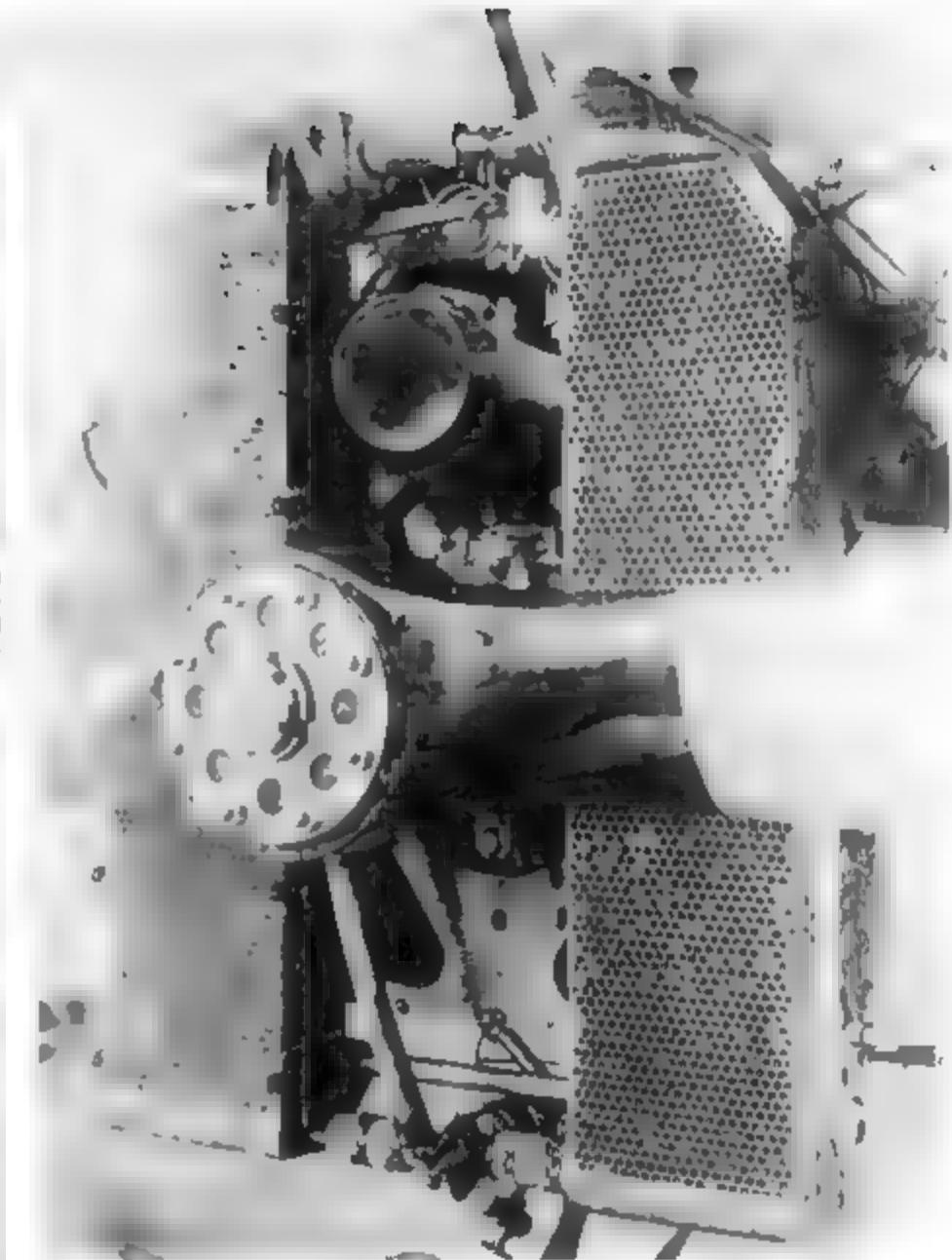
S.E.5a
220 hp (Direct)
Wolseley Viper



This S.E.5a, built by the Royal Aircraft Factory, is believed to be one of the first to be powered by the 220 hp Wolseley Viper. The constructor's number 120 on the nose indicates that this aircraft may be C1120, one of fifty-six S.E.5as shipped to the United States and assembled by Curtiss. Rather small under wing roundels are carried on this aircraft. (John R Carlson)



The Inboard location of the wing roundels were a feature common to the early Royal Aircraft Factory built S.E.5as. The Aldis telescope gunsight has been replaced by a ring and bead type of gunsight. (John R Carlson)



(Above) The radiator installation of a Wolseley Viper powered S.E.5a. Twin radiator blocks have replaced the one piece automobile type radiator of the Hispano-Suiza versions. The rubber hose leading from beneath the propeller hub is the lubrication hose for the Constantinesco C.C. synchronization gear. The Large open tube above the propeller is the air intake. (Robert Sheldon)



(Above) A4563, the third S.E.5 prototype that later became the S.E.5a prototype, had a somewhat lengthy service career. After the test S.E.5a flight program was completed, it was sent to No 56 Squadron in France on 11 June 1917. Shot up in a dogfight, it was sent to No 1 Aircraft Repair Depot for repairs on 23 September. By February of 1918, it was serving with No 84 Squadron and was crashed by Lt L J V Sorsoleil on the 24th. Seen during recovery operations after the crash, A4563 was officially stricken off RFC rolls the following day. (RAF Museum)



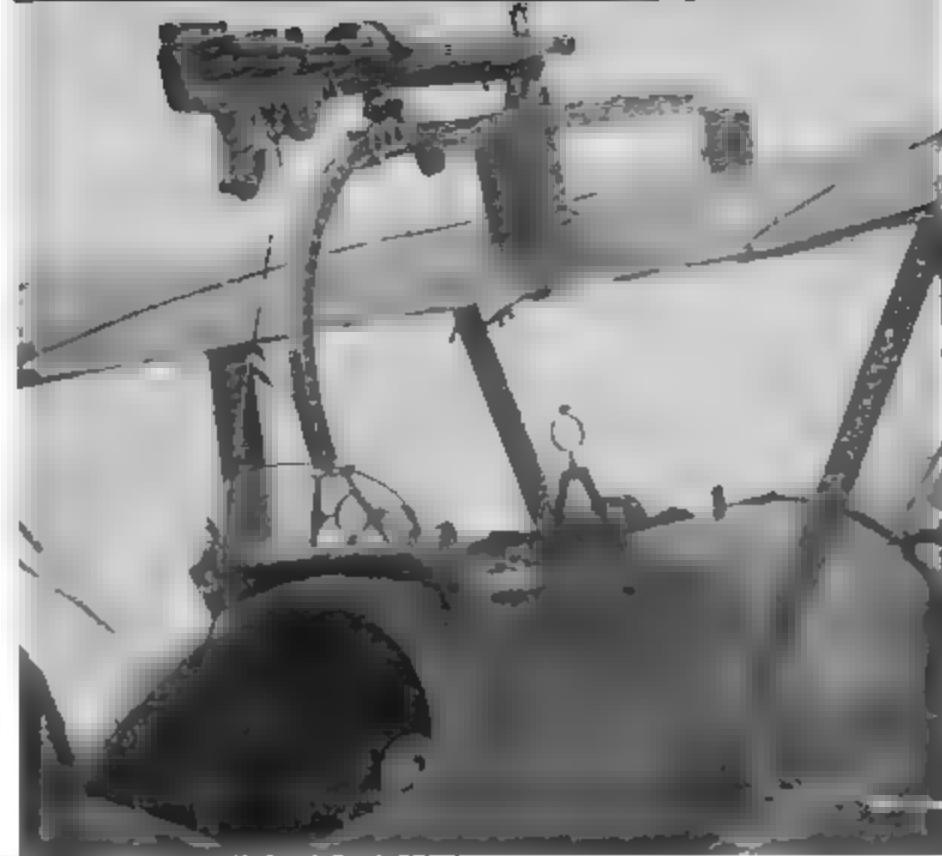
(Above and Below) An unarmed S.E.5a of a training unit taxis across the aerodrome at Leighton and later is seen coming in for a landing. Because of its ease of handling and robustness of its airframe the S.E.5a was an ideal training aircraft. (John R Carlson)



(Left) C9061, an Austin built S.E.5a, on its back after a landing accident. Since the aircraft is unarmed it is probably from a training unit. It is powered by a Viper engine, but has the early lighter landing gear. The aircraft appears to have suffered little structural damage as a result of the crash, a testament to the strength of the S.E.5a. (John R Carlson)



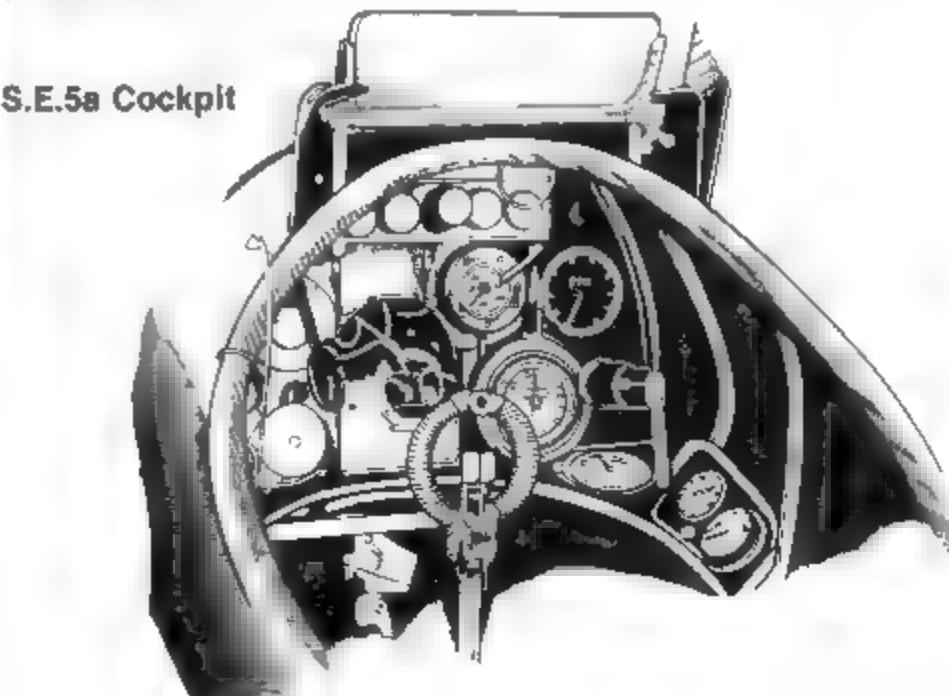
(Above) F5481, a machine of the seventh Vickers-Waybridge production batch. Packing blocks were used to raise the Lewis gun above the propeller arc of the geared Hispano-Suiza engine. The lower position of the airscrew of the Viper engine allowed the lower positioning of the Lewis gun, which was accomplished by simply deleting the front packing block under the Foster mount and replacing the rear packing block with a smaller one. The inscription on the fuselage indicates that this is a 'presentation' aircraft, paid for with funds donated by the 16th Battalion York and Lancaster Regiment (F.W.P.). (John Carlson)

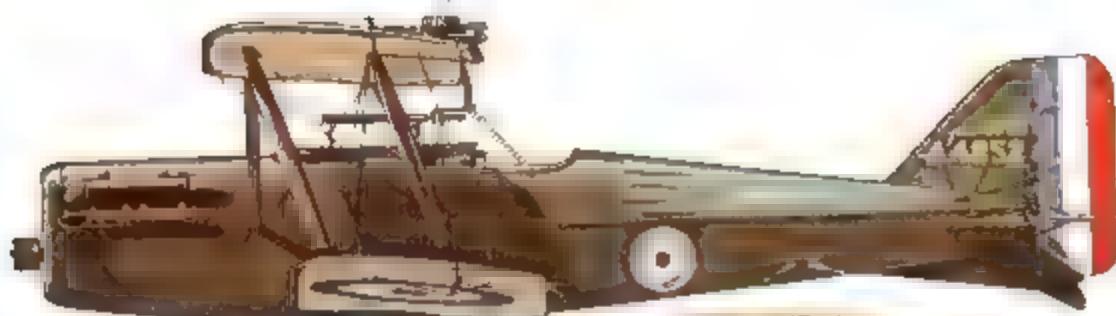


(Above) The high foster slide mount with the extension was attached just in front of the windscreen. The Aldis gunsight has been removed but the mounting pieces are still in place. (Ernest R McDowell)



(Above) Cockpit instrumentation of an S.E.5a was relatively complete for the time, including a tachometer, airspeed indicator, altimeter, oil and air pressure gauges, radiator thermometer, and a compass. The throttle and mixture controls were mounted on the pilot's left, and the fuel pump was on the right. The gun firing buttons were on the control column. The box atop the instrument panel was for a spare Lewis ammunition drum, but appears to be in use as a case for map rolls. The hand pump for the Constantinesco synchronization gear was mounted on the cockpit floor, between the pilot's knees. (John R Carlson)

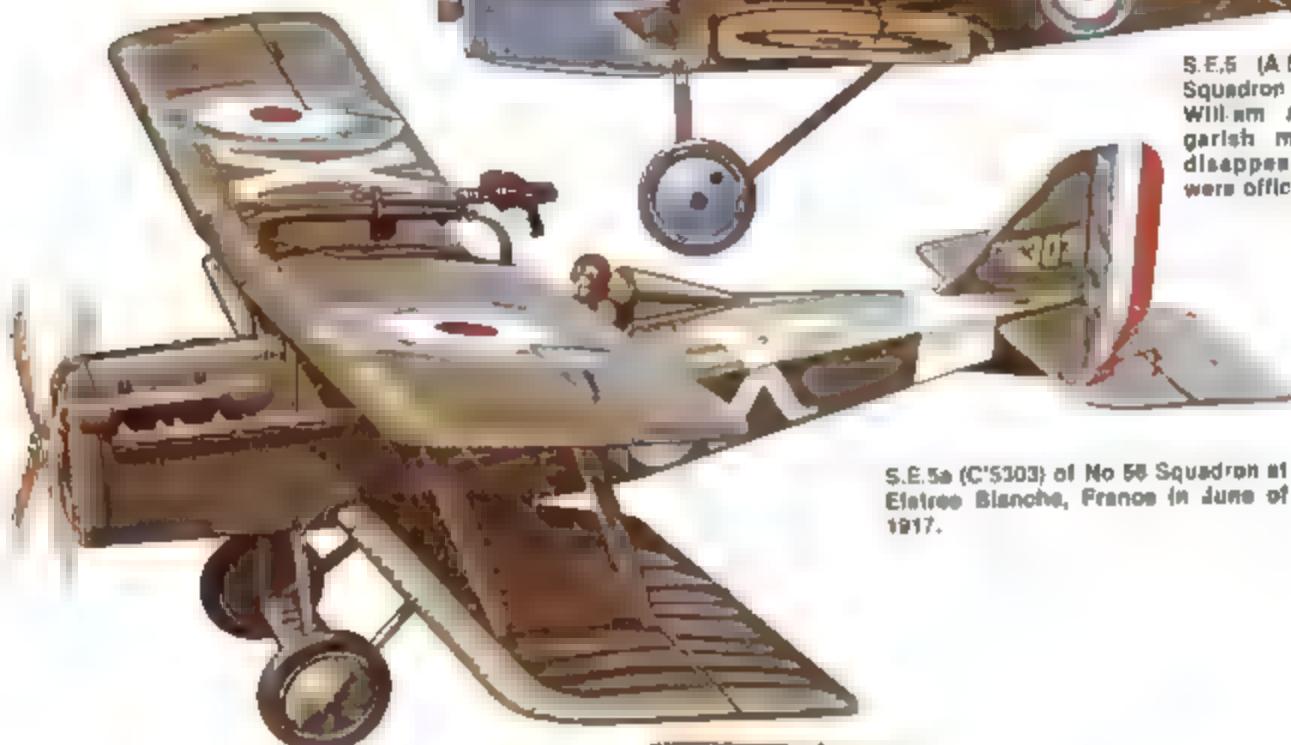




S.E.5 (A4852) of No 58 Squadron at London Coney prior to the aircraft being modified and prior to the unit being transferred to France. This aircraft was flown by Lt W B Melville.



S.E.5 (A8838) of No 58 Squadron flown by Capt William A Bishop. Such garish markings quickly disappeared since they were officially discouraged.



S.E.5a (C5303) of No 58 Squadron at Eclaire Blanche, France in June of 1917.

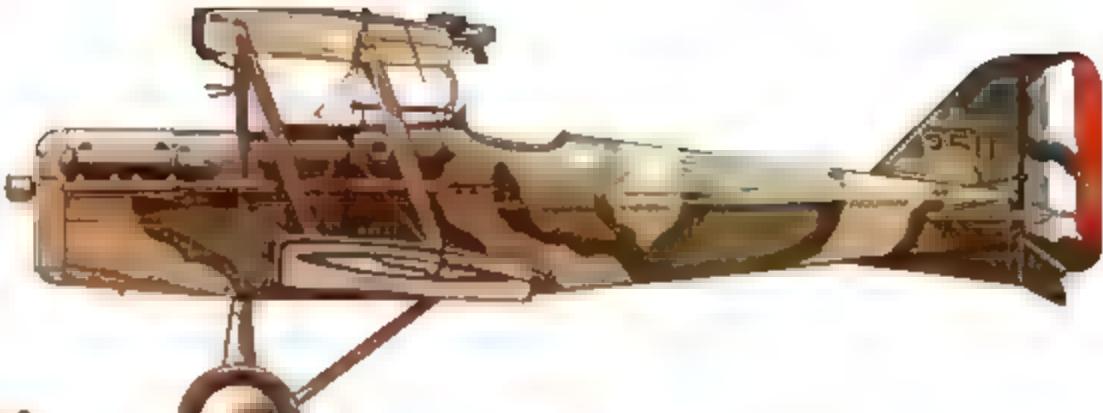


S.E.5a (B585) of No 58 Squadron at Eclaire Blanche, France in June of 1917. This aircraft was flown by Lt M E Mealing, MC.



S.E.5a (F5481) a presentation aircraft paid for by the 16th Battalion York and Lancaster Regiment.

S.E.5a (D3511) of No 40 Squadron was flown by Major Roderic Stanley Dallas, the leading Australian Ace with fifty-one victories.



S.E.5a (C1904) of No 85 Squadron at St Omer during June of 1918. This aircraft was flown by Billie Bishop.



S.E.5a (D5995) of No 143 Squadron while on Home Defence duty at Throwley in 1918. The White on the rudder and roundels have been toned down and a flame damper has been added to the exhaust for night fighting.



S.E.5a (F8040) of the 25th Aero Squadron, United States Air Service, Toul, France in November of 1918. Pilot was Lt Raymond C Watts.



S.E.5a of the 94 Squadron (Pursuit), United States Air Service, Texas 1920. Because of the heat of the Texas sun S.E.5as were often flown with the top engine panel removed.



The S.E.5a In Combat

The S.E.5a eventually served with twenty-five RFC/RAF Squadrons; fifteen on the Western Front, three in Macedonia, two in Palestine, one in Mesopotamia, and four Home Defense Squadrons*. Its greatest achievements were, of course, in France where it served as the mount for some of the most well known British aces.

Britain did not have an official ace system, nor did the British, unlike the French and Germans, widely publicize the exploits of their fighter pilots (Albert Ball being a notable exception). However many airmen of the British Empire, attaining considerable scores against the enemy, became famous to their peers and the public alike. Six of the top ten British aces flew the S.E.5a at some time in their careers.

Long reputed to be Britain's top ace was Major Edward G. "Mick" Mannock, who flew the S.E.5a with both No. 74 and 85 Squadrons. Mick Mannock has been widely credited with seventy-three victories, but his total has been in dispute for many years. The late Douglas Whelton thoroughly researched Mannock's victory claims for his biography of the ace, *Mannock, Patrol Leader Supreme* and was able to credit him with sixty-four victories — still a formidable score. Despite the controversy over the number of his victories, Mannock was an extremely capable pilot and superb combat leader, well respected by the pilots who flew with him. Mannock is known to have flown at least five different S.E.5as during his combat career, the most famous of which was the Vickers-Weybridge built D276(A) in which he gained sixteen victories while with No. 74 Squadron.

Mannock took command of No. 85 Squadron in June of 1918 and gained his final eight victories in a Vickers-built S.E.5a (E1295). It was undoubtedly the aircraft in which Mannock was killed on 26 July 1918 while on patrol along with Lt. Donald C. Inglis flying E294. Mannock and Inglis had brought down a German two-seater near Lysشم and were flying back to their base when Mannock's aircraft hit by ground fire, burst into flames and crashed. Inglis' S.E.5a was also hit and he just barely made British lines before crashing.

A score of sixty-four victories is accurate for Mannock. It would place him second to Canada's Captain William A. "Billy" Bishop as Britain's leading ace. Bishop's score of seventy-two is certain. Bishop gained half of his score while flying Nieuports with No. 60 Squadron, and later gained eleven victories while flying the S.E.5 with that unit. After a leave, he became Mannock's immediate predecessor as Commanding Officer of No. 85 Squadron in May of 1918. Bishop gained his final twenty-five victories on the S.E.5a (mostly in the Wolseley built C8490) before being retired from combat in June to help form a separate Canadian Air Force. Bishop later served in World War Two.

An exponent of the S.E.5a was Major James B. McCudden, who became Britain's fourth ranking ace with fifty-seven victories. He flew both the S.E.5 and the S.E.5a with No. 56 Squadron, his most famous ship being the Hispano-Suiza powered B4863(G), built by the Royal Aircraft Factory. He was flying this aircraft during the famous dogfight of 23 September 1917, in which the well-known German ace Lt. Werner Voss was killed. After a ten-minute fight with six S.E.5as of No. 56 Squadron, Voss was finally brought down by Lt. Arthur P. F. Rhys-Davids, flying S.E.5a B525. In McCudden's opinion, the S.E.5a was a most efficient flying machine, far and away superior to the enemy machines of that period. He also praised the aircraft for its great strength, its diving and zooming powers, and its splendid view. Apart from this, it was a most warm, comfortable, and easy machine to fly.

McCudden was recalled to England for an instructional tour in March of 1918, and in July he was posted to the command of No. 60 Squadron. It was while enroute to assume this command that he was killed on 18 July 1918 at Aux-le-Chateau aerodrome when his aircraft crashed due to engine failure.

The leading Irish ace of the war was Captain George E. H. McElroy, who flew S.E.5as with Nos. 24 and 40 Squadrons, gaining forty-nine victories. While with No. 24 Squadron, McElroy flew the Farnborough built C1088, which he crashed into a tree on 7 April 1918.



(Above and Below) DAWN PATROL. a flight of S.E.5as of No 1 Squadron, drones over the aerodrome at Clarmarais on 21 June 1918. As the airwar heated up, tactics changed from lone wolf hunting to team efforts where four to six aircraft carried out patrols as a formation. (John R Carlson)



*The Royal Air Force (RAF) officially came into being on 1 April 1918 when units of the Royal Flying Corps (RFC) were combined with field units of the Royal Naval Air Service into a single organization.

After being sent on leave, he joined No 40 Squadron in June. On 31 July 1918, he was shot down and killed in S.E.5a F1310, but the exact circumstances of his death remain unknown.

Captain Anthony W Beauchamp-Proctor gained fifty-four victories to become the leading South African ace of the war. He achieved all his victories with the S.E.5a as a member of No 84 Squadron. Beauchamp-Proctor was also the British Empire's leading balloon buster with sixteen of his successes against German observation balloons, and no doubt found the strength of the S.E.5a to be quite valuable for the most difficult kind of combat. He survived the war but was killed on 21 July 1921, when his Sopwith Snipe crashed during rehearsal for an RAF air pageant.

In October of 1917, nine S.E.5as were allocated to Macedonia with the formation of Nos 17 and 47 Squadrons. The first S.E.5a arrived in November and by February of 1918, each unit had four. In October of 1917 General Edmund Allenby in Palestine requested up-to-date fighter aircraft. He wanted a squadron with one flight of S.E.5as and one of Bristol F.2bs. His request was fulfilled in January of 1918. S.E.5as of Nos 111 and 145 Squadrons took part in the final Allied offensive in the Middle East during September of 1918, by keeping enemy aircraft grounded at Jener with standing patrols.

The S.E.5a's role as a Home Defense fighter was short lived. The water cooled engine which powered the S.E.5a took far too long to warm up, consequently it could not be scrambled as quickly as the rotary engined Sopwith Camel. The S.E.5a was also too difficult to land at night on the small airfields of the time.

In October of 1918, the American Expeditionary Force (AEF) purchased thirty-eight Austin built S.E.5as for use by the United States Air Service. According to a report now in the files of the Air Force Museum, some of these S.E.5as were powered by 180 hp Wright-Martin Hispano-Suiza engines of American manufacture. There is no record of these engines being installed at the factory so it's possible that the aircraft were delivered without engines and fitted with the Wright-Martin built power plants in the field.

Most of the S.E.5as purchased by the AEF were turned over to the 25th Aero Squadron at Toul, with the unit receiving its first S.E.5a on 1 November 1918. By 17 November, nine aircraft had been received, and the squadron was fully equipped by the end of the month.

An S.E.5a being put through stunt maneuvers over Noakes, Wyton. While the S.E.5a could not turn as tightly as the Sopwith Camel or the Fokker Dr.I, it was not as sluggish as the Spad and could usually hold its own in a dogfight. It did not have the tricky handling characteristics of the Sopwith Camel, being very easy to fly and a steady gun platform, and in a crash the pilot stood a greater chance of survival than in a Camel. (RAF Museum)

Consequently the 25th Aero Squadron was able to fly only two limited patrols before the Armistice, and saw no combat. Some of the pilots of the unit, however, had previous service with British units and had gained victories. This included the unit's Commanding Officer, Captain Reed G Landis, who had gained twelve victories while flying the S.E.5a with No 40 Squadron.

Other American aces of note also flew the S.E.5a, including Captain William C Lambert, who gained twenty-two victories to become the second ranking American ace of the war. He gained all his victories while flying with the RFC as a member of No 24 Squadron. Captain Edward Whittle Springs gained four of his twelve victories while flying the S.E.5a, serving under both Bishop and Mannock in No 85 Squadron. Injured in a crash in June of 1918, he was transferred to the American 148th Aero Squadron and attained the rest of his victories flying Sopwith Camels. Lt George A Vaughan, who finished the war as commander of the 17th Aero Squadron, gained seven of his thirteen victories with the S.E.5a while serving in No 84 Squadron. Another American who gained all his victories while flying with the British was Captain Oren J Rose, who was the leading ace of No 92 Squadron with sixteen victories. Captain Howard A Kuhberg gained sixteen victories as a member of No 1 Squadron.

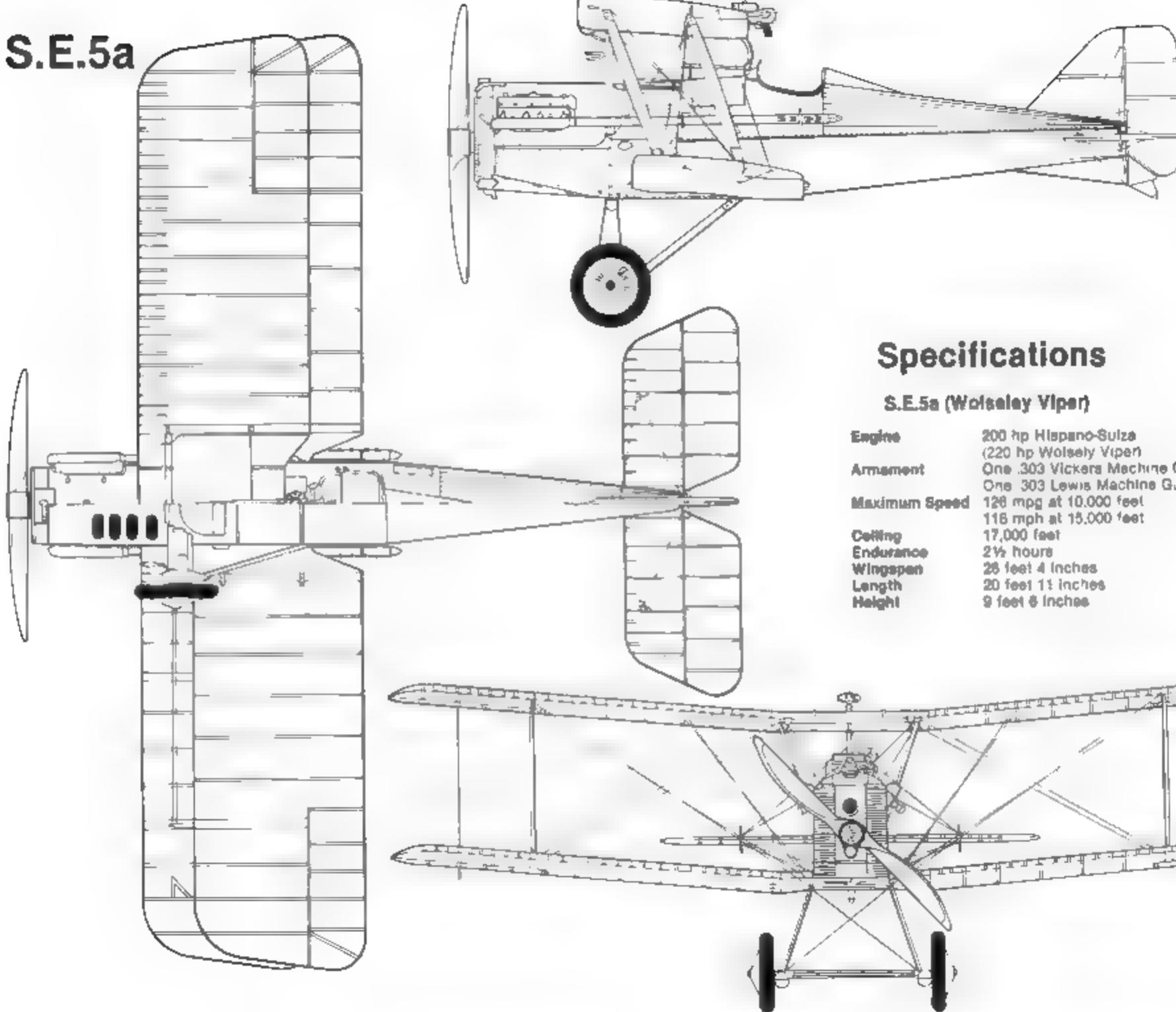


(Above) This S.E.5a is seen over Eastbourne during 1918. (RAF Museum)

(Below) An S.E.5a taking off into low hanging cloud cover over the hangars at Lympne. (RAF Museum)



S.E.5a



Specifications

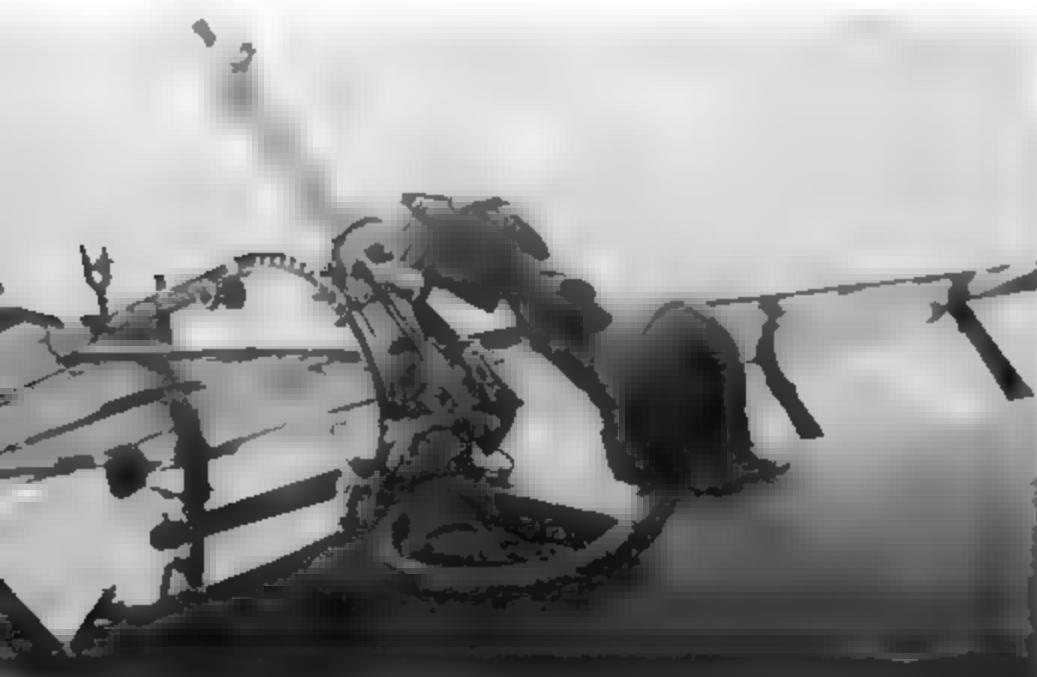
S.E.5a (Wolseley Viper)

Engine	200 hp Hispano-Suiza (220 hp Wolseley Viper)
Armament	One .303 Vickers Machine Gun One .303 Lewis Machine Gun
Maximum Speed	120 mph at 10,000 feet 118 mph at 15,000 feet
Ceiling	17,000 feet
Endurance	2½ hours
Wingspan	26 feet 4 inches
Length	20 feet 11 inches
Height	9 feet 6 inches



(Above Left) An S.E.5a making a low pass over its aerodrome before heading out on patrol. (John R Carlson)

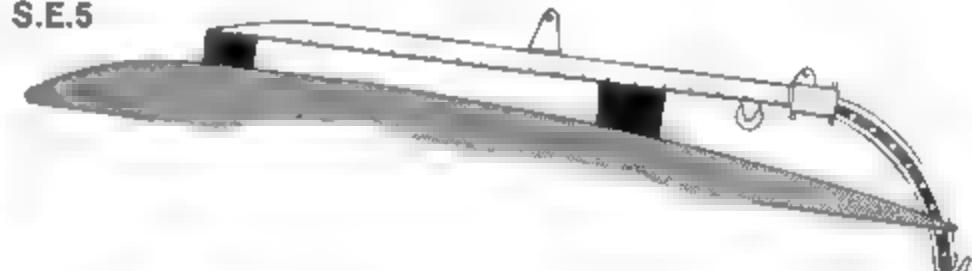
(Below) The pilot demonstrates how to change the Lewis ammunition drum. The new longer Foster sliding gun mount allowed the Lewis gun to slide much closer to the pilot making the changing of the ammunition drum a somewhat easier task. However changing the drum was much more difficult than it looks; manhandling the Lewis gun at high altitudes in a 100 mph slipstream took great strength — and the pilot had to fly the plane at the same time. Most pilots broke off combat and dived to lower altitudes to change the Lewis drum. (John R Carlson)



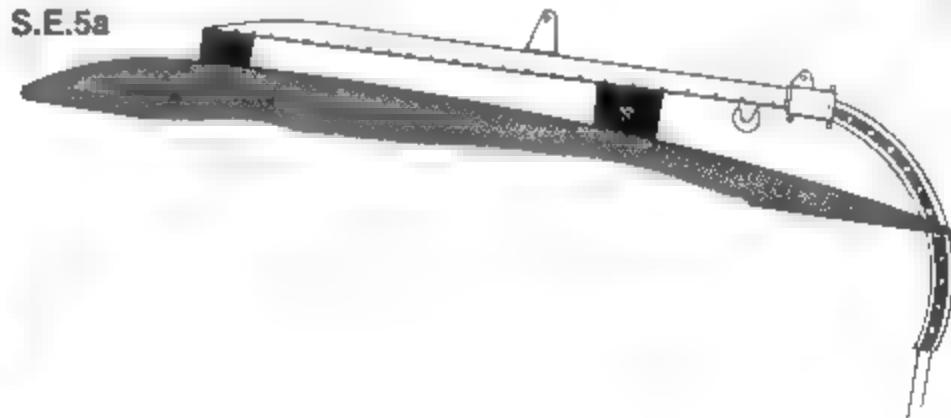
(Above) A night fighter signaling take off with a Very pistol. The magneto hand crank can be seen below the cockpit, as well as the wireless stowage compartment hatch which can be seen just aft of the cockpit. This compartment was originally designed for a wireless installation, which was never fitted to a S.E.5a. (John R Carlson)

Foster Sliding Gun Mount

S.E.5



S.E.5a





(Above) Pilots and officers of No 1 Squadron pose with their S.E.5as at Cleydon Marshalls on 3 July 1918. Like No 34 Squadron, No 1 Squadron also received its first S.E.5as in January of 1918, becoming operational on them the following month. The personnel seen are: (left to right) Lt Newman, Lt Smart, unknown, Lt Quarson Knight, Lt Croesley, Lt Henderson, Lt Knapp, Captain P J Clayton, Captain Sleson, unknown, Lt Moody, Capt J T Jones, Lt Owen, Captain Lavers, Lt Simpson, Padre Banks, and Lt Bateman. Knight was an American pilot who served with the unit for about four months. Jones, a leading ace with forty victories, was a member of No 74 Squadron, who was visiting No 1 Squadron at the time. The unit marking of No 1 Squadron was a white circle aft of the fuselage roundel, with the individual identity letter being carried just forward of the tail. (RAF Museum)

(Below) A flight of No 34 Squadron at Le Hameau in November/December of 1917. The leading South African ace of the war, Captain Anthony W Beauchamp-Proctor, with fifty-four victories, was a member of this Squadron. (RAF Museum)



(Above) Major Roderic Stanley Dallas in the cockpit of D3511 of No 40 Squadron on 31 May 1918. A leading Australian ace with fifty-one victories, Dallas was originally an RNAS pilot and was posted to the command of No 40 Squadron after the formation of the RAF in April of 1918. He gained his last twelve victories with that Squadron. Major Dallas was killed on 19 June 1918 during a dogfight with three Fokker Dr.IIs of Jasta 14. The aircraft carries a non-standard three color camouflage scheme. (RAF Museum)

(Below) A flight of No 34 Squadron at Le Hameau. All of the S.E.5as have the early landing gear struts, but both two-bladed and four-bladed propellers can be seen. No 34 was one of the first S.E.5a Squadrons, receiving its aircraft during November/December of 1917. (RAF



Camouflage and Markings

From 1916 onward, British military aircraft were painted a Khaki Brown color known as P.C. 10 (Protective Covering No 10). This color was made by a mixture of 250 parts of Yellow Ocher (natural oxide of iron) with one part of Lamp Black (or Carbon Black). This resulted in a Dark Brown color as a dry mixture, but when mixed with a glossy liquid medium (usually cellulose or oil varnish) it took on a slight Greenish hue under certain light conditions. Therefore, British aircraft such as the S.E.5 and S.E.5a would look Greenish Brown in color with the Brown predominant. After the aircraft had been in service for a time the effects of weather and sun reduced the color scheme to a very definite Brown tone.

The P.C. 10 coloring was applied to the upper surfaces of the wings and tailplanes of S.E.5s and S.E.5as, and the entire fuselage of the S.E.5a. The undersides of the wings and tailplane (and the fabric portion of the fuselage underside of some S.E.5s) were coated in clear dope. In some cases the P.C. 10 upper surface color overlapped the undersurfaces of the wings for an inch or so, resulting in an outlined effect when viewed from underneath.

National Markings

The British adopted a roundel type of insignia early in the war after the Union Jack had proven ineffective. Roundels were painted in the national colors of Blue, White and Red with Blue as the outside ring, White the middle ring, and Red in the center. The shade of Blue used was a light to medium tint known as Ultramarine. The roundels were usually carried in six positions on the wings and fuselage. The roundels were painted full-chord on the wings and between the upper and lower longeron on the fuselage. Roundels on P.C. 10 painted surfaces had a one-inch White outline. No outline was used on roundels painted on clear doped surfaces on S.E.5s of the first production batch, only the fuselage roundels were outlined in White. In addition to the roundels, S.E.5s and S.E.5as like other British military aircraft had their rudders striped in the national colors, with Blue on the leading edge, and Red on the trailing edge.

Unit Markings

British aircraft were relatively bland in regard to unit identification markings, although some flamboyant devices did appear, such as the Red and Blue noses flown by No. 60 Squadron; these lasted for only a short time. In mid-1917 the British adopted a system of simple geometric devices as unit markings, using hexagons, triangles, circles, squares, and stripes of various sizes, angles, and arrangements. These unit markings were applied to the fuselage sides, usually but not always aft of the roundel, and in some units on the fuselage upper decking. In March of 1918, the unit markings then in use by most units were exchanged for others in an attempt to confuse the enemy. For example, the eighteen-inch White stripe used by No. 56 Squadron was replaced by two oblique two-inch White stripes in front of the tailplane.

Personal Markings

Flamboyant personal markings were quite rare on British aircraft during the First World War—indeed they were officially discouraged. Individual identification within air units was by the use of an identity letter applied to the fuselage sides, and in some cases to the starboard upper surface of the top wing and port lower surface of the bottom wing. Sometimes numerals were used instead of letters. There were some cases of more colorful personal markings applied to S.E.5s and S.E.5as, such as the Maple Leaf device used by a Canadian pilot of No. 111 Squadron and the Grenadier Guards badge applied to the S.E.5a flown by Lt E.W. Jordan of No. 29 Squadron.

Of the 5,638 S.E.5as ordered, 5,138 were eventually completed: 761 in 1917 and 4,377 in 1918.* With the entry of the United States into World War I, fifty-six S.E.5a airframes were shipped to the United States where they were assembled by the Curtiss Company. One aircraft (C8740) was tested at McCook Field in Ohio under the project number P-52.

*According to J.M. Bruce in his book *British Aeroplanes, 1914-1918*.

Large scale production of the S.E.5a was planned in the United States with Curtiss contracted to build 1,000 aircraft, powered by the 180 hp license built Wright-Martin-Hispano-Suiza. Only one example, serialled S.C.43153, was completed before the contract was cancelled with the coming of the Armistice. Official tests of this aircraft began on 20 August 1918 at McCook Field. Its performance was somewhat inferior to the British 200 hp S.E.5a, having a top speed of 117 mph at 10,000 feet compared with 130 mph for the British S.E.5a. It could climb to that altitude in 13 minutes, while the British S.E.5a could reach the same altitude in 10 minutes 50 secs.

S.E.5a Unit Markings and Identity Letters (Western Front 1917-18)

All markings are White on P.C.10 unless otherwise noted.

No. 40 Squadron (March 1918)

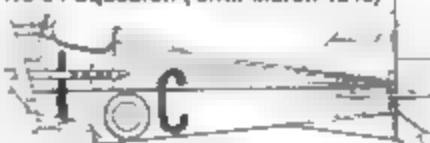


Note: Identity letters of No. 40 Squadron were Black with white outlines. On some aircraft the zigzag went the other way.

No. 41 Squadron (March 1918)



No. 24 Squadron (until March 1918)



No. 24 Squadron (from March of 1918)



No. 56 Squadron (before 1918)



No. 56 Squadron (after March 1918)



No. 60 Squadron (before March 1918)
Stylized letter was repeated on upper wing.

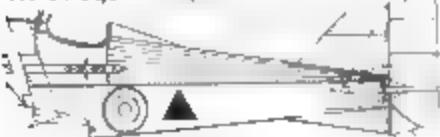


Alternate Letter Position

No. 60 Squadron (after March 1918)



No 64 Squadron (until March of 1918)



No 64 Squadron (after March 1918)



No 68 Squadron (No 2 Squadron AFC) (before March of 1918)



No 68 Squadron (from March of 1918)

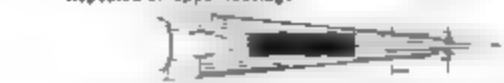


No 74 Squadron

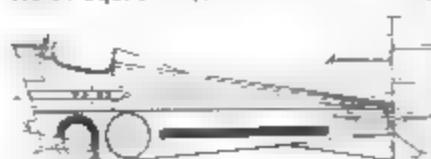


Alternate locations

No 74 later used numbers instead of letters.
Repeated on upper fuselage.



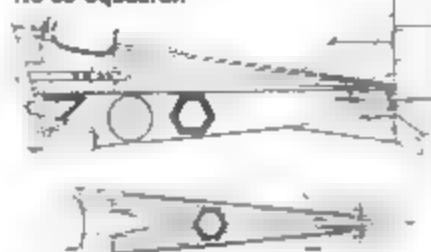
No 84 Squadron (before March of 1918)



No 84 Squadron (after March of 1918)



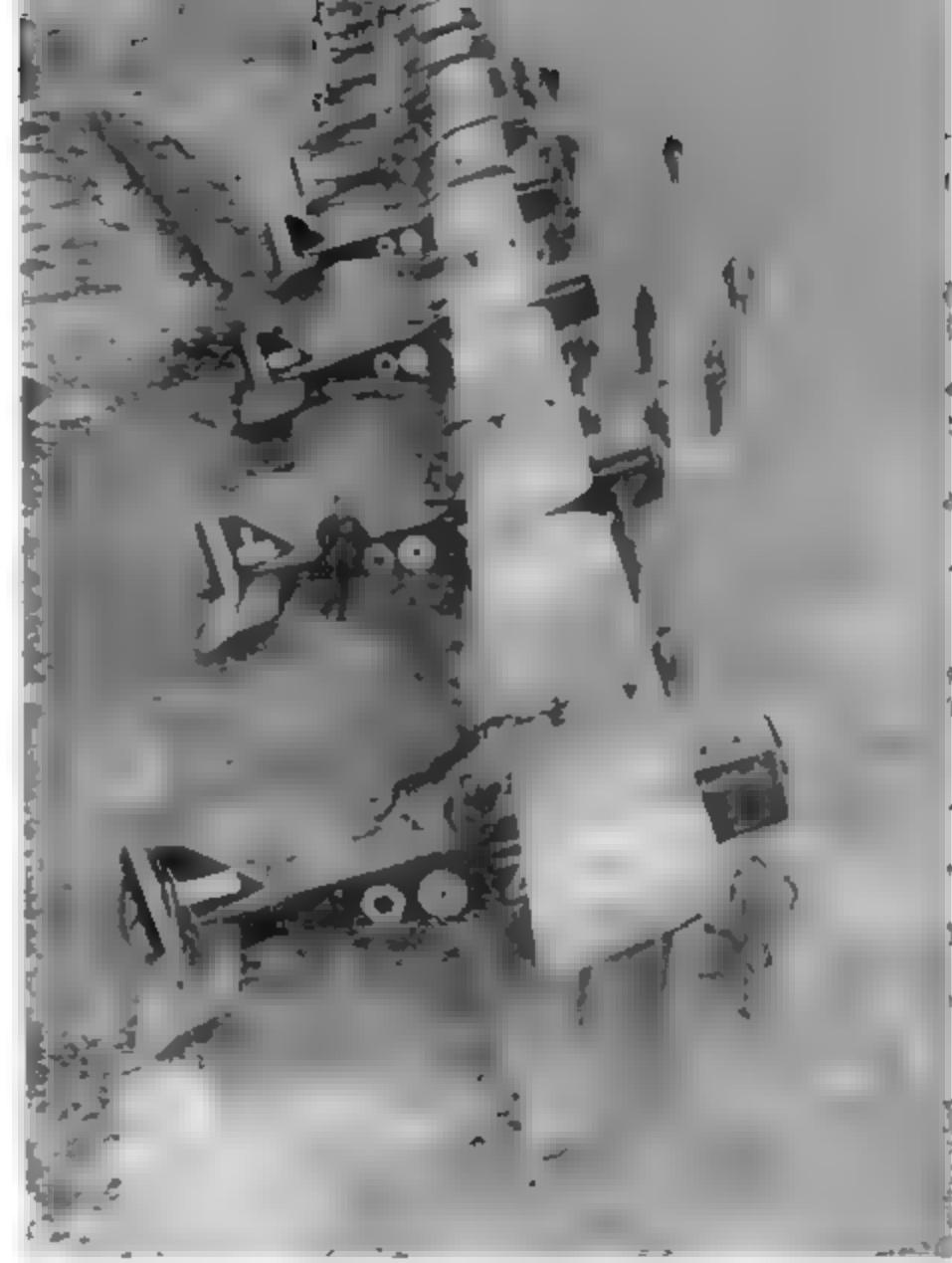
No 85 Squadron



No 92 Squadron



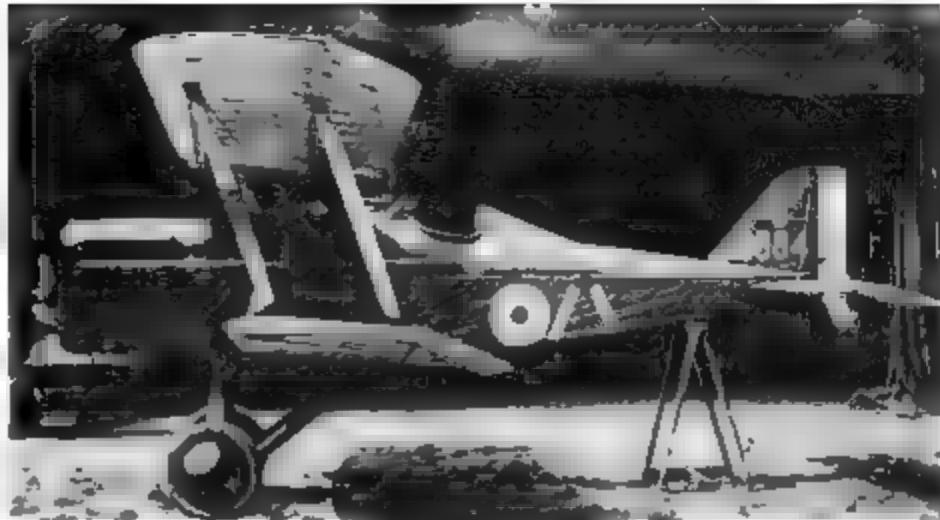
Pilots of No 82 Squadron pose in front of two of the Squadron's S.E.5as on 14 November 1918. Seated at the right is Lt Oren J Rose, an American pilot, who gained sixteen victories to become the unit's leading ace. The three stripes all of the roundel were the squadron markings of No 92 Squadron. (RAF Museum)



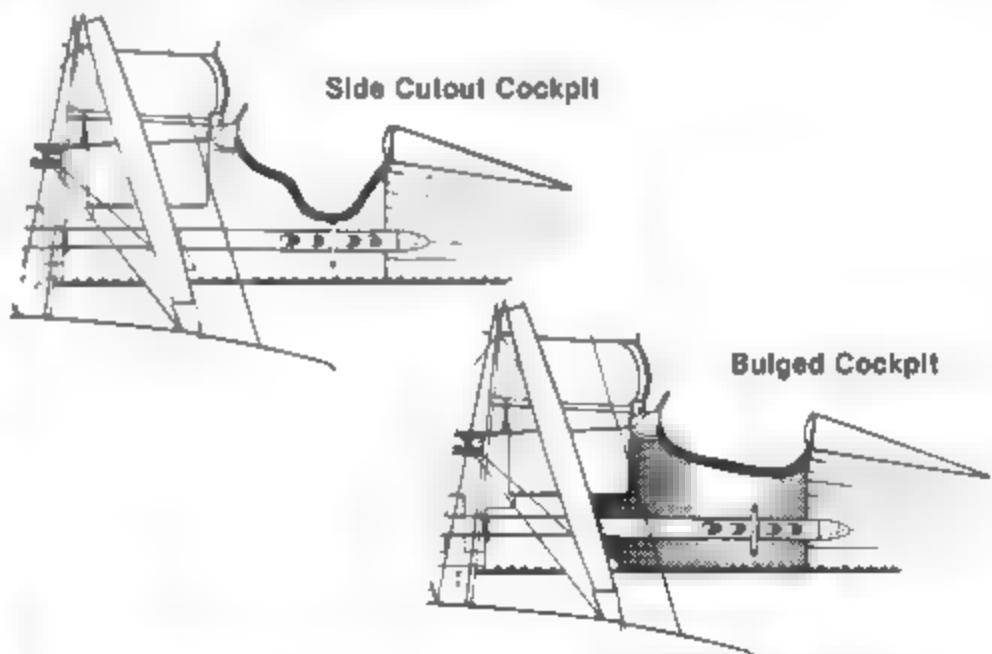
One of the most famous S.E.5a units was No 85 Squadron whose aircraft are seen at St Omer on 21 June of 1918. The serials have been obscured by the censor but the nearest aircraft was C1804 (Z), once flown by Bishop. A large German Shepherd can be seen straddling the cockpit. The second aircraft was D6851 (X), flown by American pilot Elliot White Springs. The third aircraft was C1931 (Y). The individual identity letters are carried on both the fuselage and the top wing. Springs' aircraft is marked with an X on the fuselage and with a T on the top wing — indicating that the upper wing is a replacement from another aircraft. The Squadron marking, a White hexagon, was revived by the Squadron during WWII and appeared on its Hawker Hurricanes and De Havilland Mosquitos. (RAF Museum)



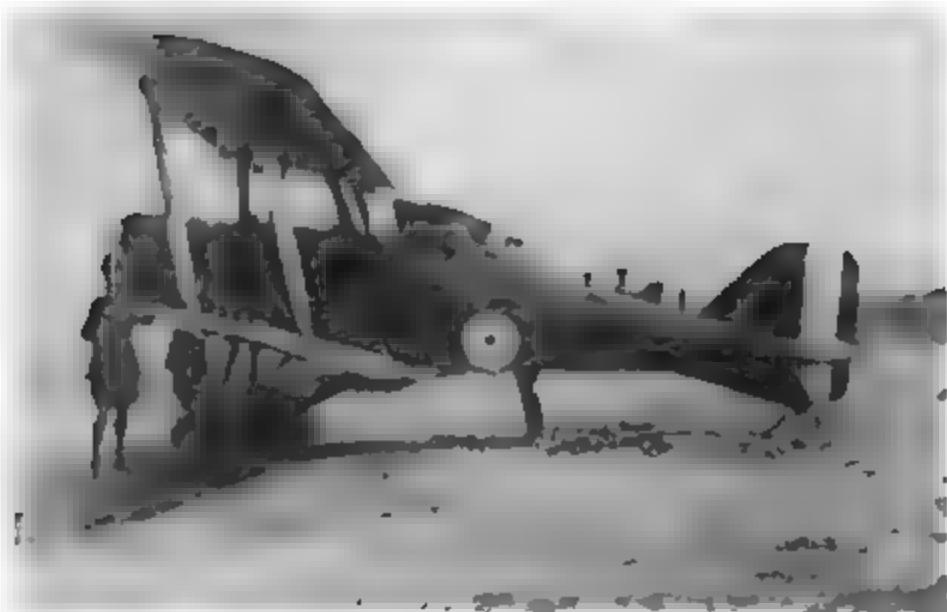
(Above) Pilots and ground crew of No 85 Squadron pose with their S.E.5as. Pilots are: (Left to Right) Cushing (Adjutant), Dymond, Daniel, J D Canning, Malcolm McGregor, Lawrence K Callahan, Elliot White Springs, Spencer Horn, A C Randall, Baker, Cunningham-Reid, H W Longton, Rosle, Carruthers, Dixon, Brown, Brewster, unknown (possibly Stuart C Elliot), Abbat, and Donald C Inglis. Both Callahan and Springs were American pilots assigned to No 85 Squadron to gain combat experience before being transferred into USAS units. Inglis was on patrol with Major Edward C Mannock on the morning that Mannock was killed. No 85 was between commanders when this photo was taken; Major William A. Bishop, who had commanded the unit for about a month, had been recalled to England two days before this photo was taken. His successor Major Mannock, would assume command of the unit later. Also seen are some of the mascots adopted by No 85 Squadron — several dogs of varying breeds and a pair of goats. (RAF Museum)



(Above) An S.E.5a of No 32 Squadron, D8854 (A). The individual identity letter is carried on the fuselage at the wing root. Built by Wolseley Motors of Birmingham, it was the thirty-fourth machine of the second production batch. (John R Carlson)



(Left) A flight of S.E.5as of No 32 Squadron is warming up at Humières on 6 April 1918. The two diagonal bars aft of the roundel were the unit markings. The aircraft serial numbers and individual identity letters have been marked out by wartime censors. The nearest aircraft has had its headrest removed and the cockpit sides lowered for additional shoulder room. No 32 Squadron received its first S.E.5as in January of 1918. (John R Carlson)

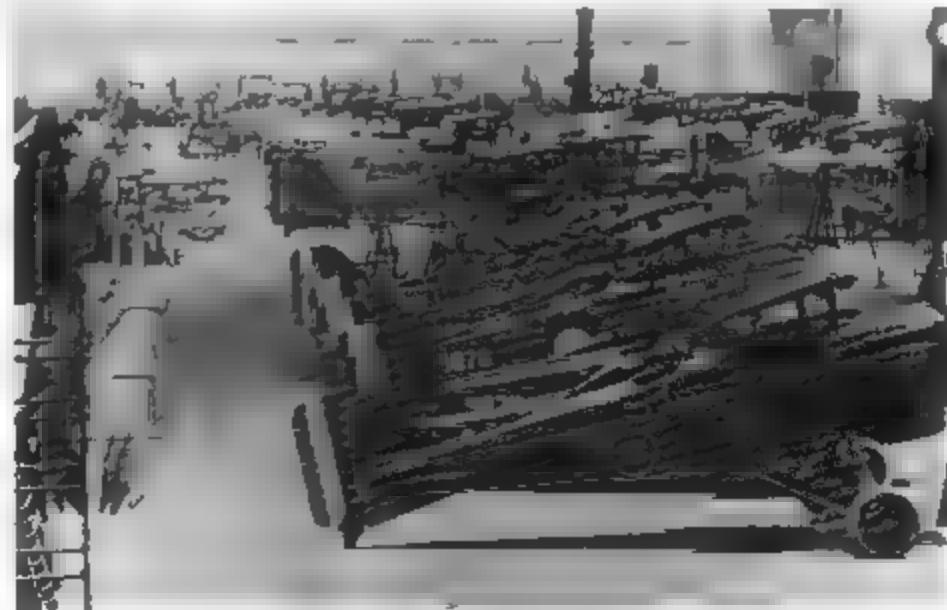
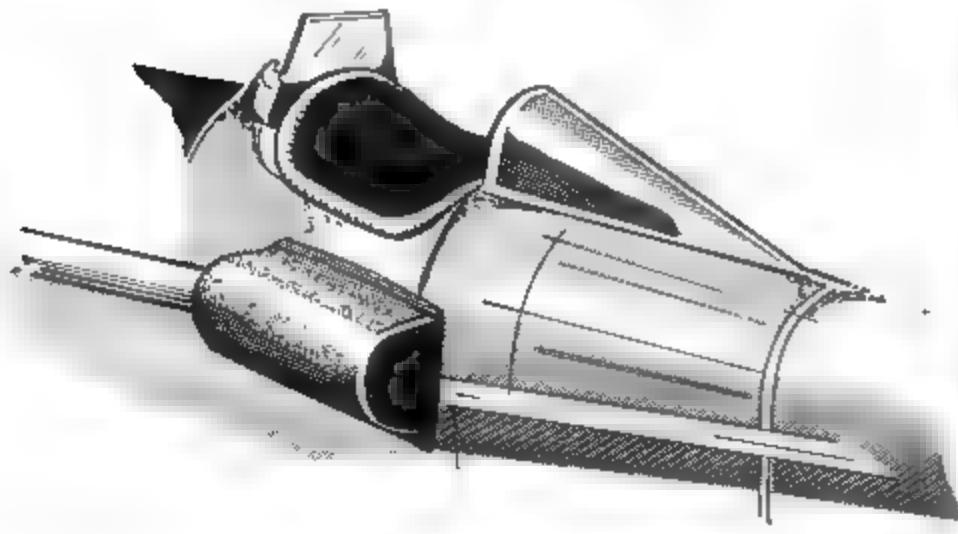


(Above) Lt Mansfield of No 94 Squadron seated in the Vickers-Weybridge built C9557 in early 1918. (RAF Museum)



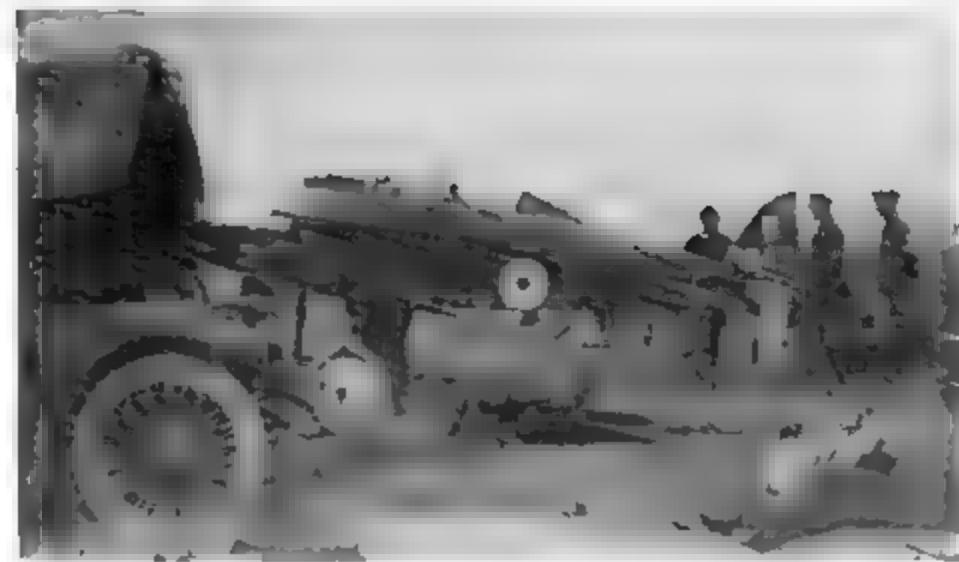
(Above) D5995, an S.E.5a on Home Defense duty with No 143 Squadron at Throwley during 1918. The white circles of the upper wing roundels and the white stripes on the rudder have been darkened, as well as flame shrouds having been added to the exhaust for night flying. (RAF Museum)

(Below) S.E.5as under construction at the Austin Motor Company, Northfield, Birmingham. The nearest aircraft (F8014) carries American roundels. The serial numbers on both the rudder and fuselage are smaller than those carried on the British marked machines. All of the thirty-eight SE.5as purchased by the AEF were Austin-built. (RAF Museum)





(Above) An interesting personal marking, obviously of a Canadian pilot, seen on a S.E.5a of No 111 Squadron. (RAF Museum)

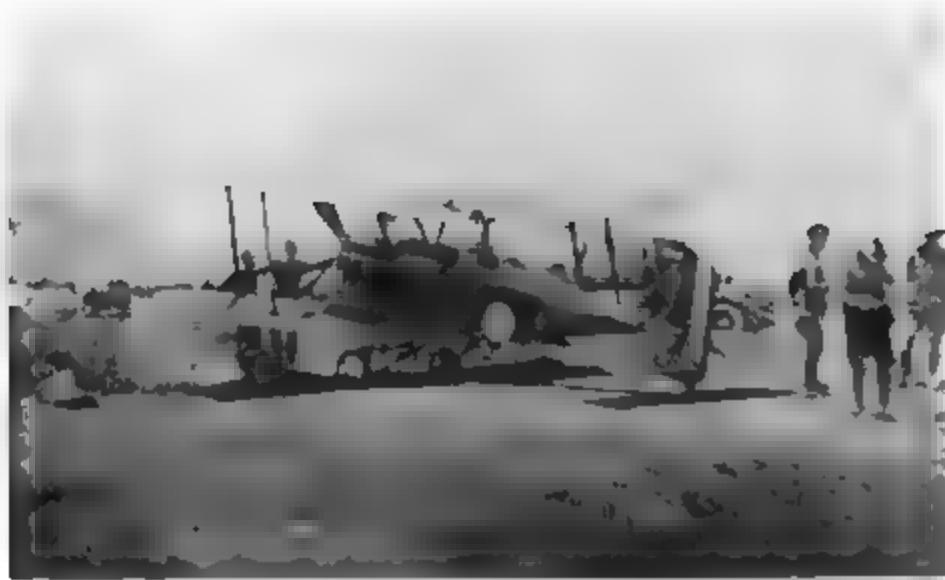


(Above) S.E.5a (B6243) of No 111 Squadron, being loaded onto a lorry after a crash landing in the Jordan Valley. (RAF Museum)

(Below) S.E.5a (B8534) and an Avro 504K, with various other aircraft in the background, at No 5 Fighting School, Helicopolis during 1918. (RAF Museum)

(Below) An S.E.5a of No 111 Squadron after a forced landing at Latron in Palestine. The white stripe on the fuselage is a personal marking. (RAF Museum)





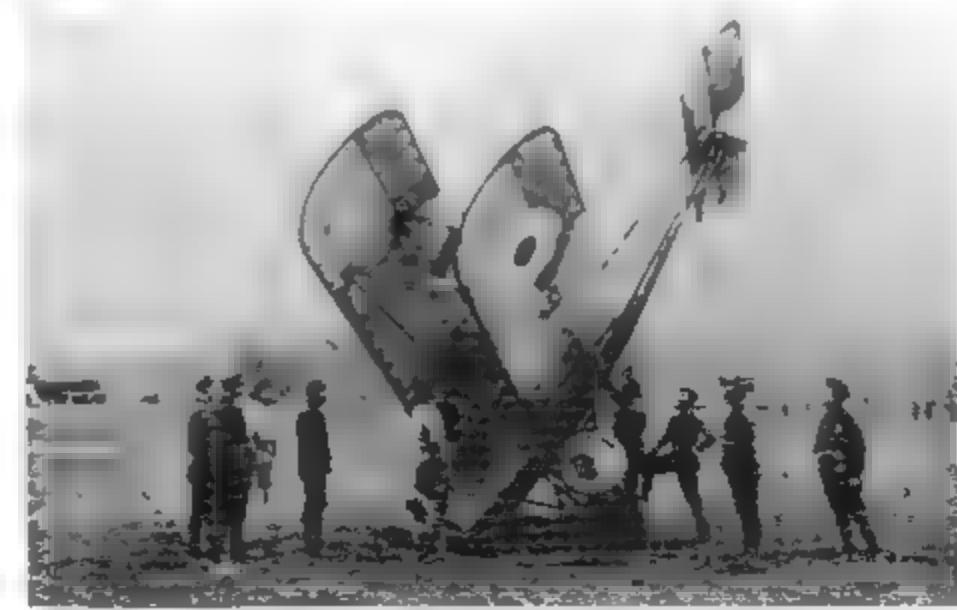
(Above) Another S.E.5a of No 111 Squadron (B49) after being forced down in the Jordan Valley. This aircraft was one of the first Martinseyde built S.E.5as, delivered in August of 1917. (RAF Museum)

(Below) Lt E W Jordan in the cockpit of his S.E.5a of No 29 Squadron, part of the Allied occupation force at Bickendorf during the winter of 1918/19. Jordan's personal marking, the badge of the Grenadier Guards, is carried aft of the fuselage roundel. (RAF Museum)



(Above) S.E.5as of No 2 Squadron, Australian Flying Corps (AFC) — formerly No 88 Squadron, RFC — at Savoy on 24 March 1918. This unit, the only Australian fighter squadron to use the S.E.5a began receiving the aircraft in January of 1918, replacing its DeHavilland D.H.5s. (John R Carlson)

(Below) S.E.5a, serial C9539 (V) of No 2 Squadron, AFC, nosed over on landing with Captain H G Forrest at Savoy in March of 1918. The white boomerang on the fuselage was a fitting unit marking for the Australian squadron, but was replaced in March with a vertical white stripe forward of the fuselage roundel. The boomerang marking was also used on the Sopwith Camels flown by No 4 Squadron of the Australian Flying Corps (AFC). (John R Carlson)





(Above) The S.E.5a flown by K M St C Q Leesek while he was with No 30 TD Squadron at Northolt in 1918. The aircraft was painted overall Light Gray. (RAF Museum)

(Below) An early Vickers-Weybridge built S.E.5a (B660) after crashing into a fence. The aircraft is believed to be of No 56 Squadron. (RAF Museum)



The pilot of this S.E.5a (E5896) turns the magneto crank below the cockpit preparatory to starting the engine. This aircraft was one of two involved in parachute experiments at Farnborough during December of 1918. (RAF Museum)

(Below) C8740, one of fifty-six S.E.5as sent to America after the entry of the United States into WWI, and assembled by the Curtiss Company. This aircraft was sent to McCook Field in Ohio for evaluation under project No P52, which can be seen painted on the rudder (John R Carlson).





(Above and Below) Two unidentified pilots sit in the cockpit of S.E.5a (H) of No 24 Squadron. The vertical bars fore and aft of the fuselage roundels were the unit markings of No 24 Squadron from March of 1918. In common with other S.E.5as of this Squadron, the headrest has been removed and a larger windscreen has been fitted. In a further modification, several pilots of No 24 had the mainplane dihedral reduced for better climb and speed performance. The stability of the S.E.5a was reduced somewhat by this modification, especially in a dive. The first pilot to have the dihedral on his S.E.5a reduced is believed to have been Captain William C Lambert, the second ranking American ace of the war, who gained all of his twenty-two victories while flying with No 24 Squadron. The aircraft is in a non-combat condition, since both the Lewis gun and Aldis gun sight have been removed. Although this is a Wolseley Viper powered machine, it has the large packing blocks under the Foster mount usually seen on Hispano-Suiza powered aircraft. (John R Carlson)



The 25th Aero Squadron was the only American unit to be equipped with the S.E.5a, however it did not see combat. The 'Executioner' marking was painted on a White oval on both sides of the 25th's aircraft. (From the collection of the late Raymond C Walls via Norman Burtt and Robert Sheldon)

Line-up of S.E.5as belonging to the 25th Aero Squadron. None of these aircraft have been fitted with a Lewis machine gun, although the Foster sliding mounts are in place. The Lewis guns were not supplied to the 25th until after the Armistice; in fact the two nominal patrols flown by the unit before the end of hostilities were flown with aircraft armed only with the Vickers machine gun. (Raymond C Walls via Norman Burtt and Robert Sheldon)

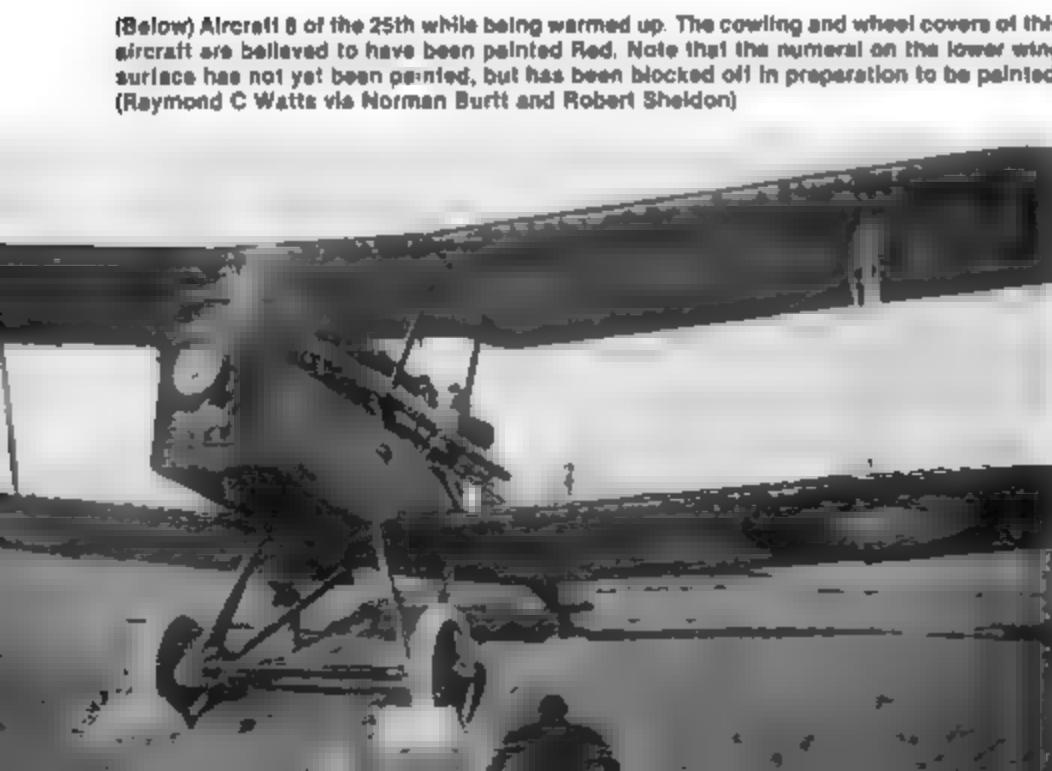




(Above) Aircraft of the 25th Aero Squadron have the White oval Squadron marking applied to the fuselage sides and a diagonal White stripe has been applied to the port upper wing. The American roundels are outlined in White and the aircraft carry a numeral in White rather than a letter (Raymond C Watts via Norman Burtt and Robert Sheldon)



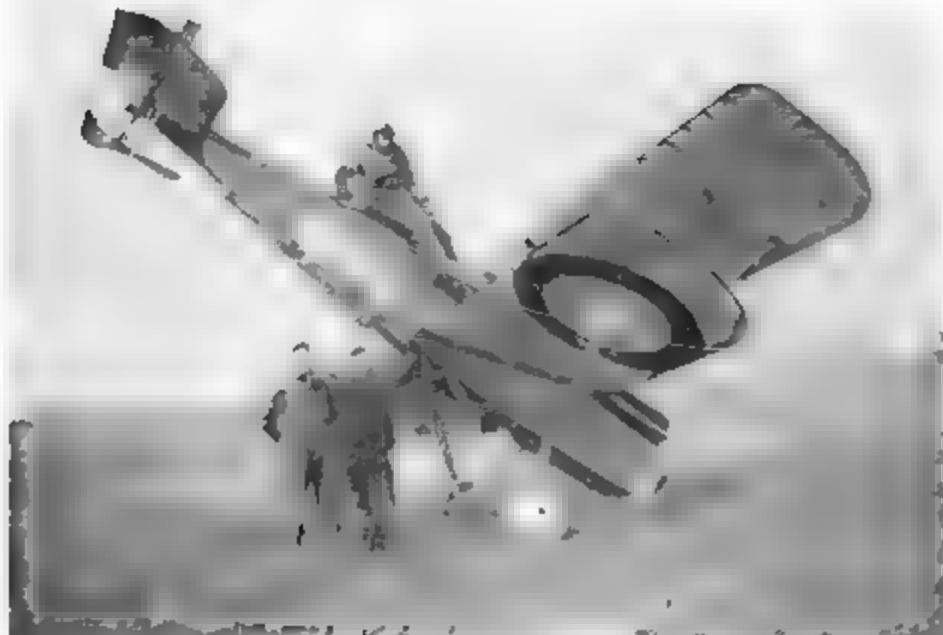
(Above) F8020, aircraft No 2 of the 25th Aero Squadron, has the aircraft number repeated on the upper wing surface. This machine, like all S.E.5as of the 25th, was Austin-built. Reports have indicated that some of the unit's aircraft were fitted with American built Wright-Martin Hispano-Suiza engines of 180 hp. (Raymond C Watts via Norman Burtt and Robert Sheldon)



(Below) Aircraft 8 of the 25th while being warmed up. The cowling and wheel covers of this aircraft are believed to have been painted Red. Note that the numeral on the lower wing surface has not yet been painted, but has been blocked off in preparation to be painted. (Raymond C Watts via Norman Burtt and Robert Sheldon)



(Below) F8040, aircraft number 11, the S.E.5a flown by Lt Raymond C Watts. The radiator cowling, wheel covers, fin, and undercarriage were painted White — not Blue as previously thought. (Raymond C Watts via Norman Burtt and Robert Sheldon)



(Above and Right) Lt Wattis climbs out of his S.E.5a after nosing it over on landing. It appears that only the propeller was damaged. The diagonal White stripe and White numeral 11 on the top of the upper wing are repeated in Black on the undersurface of the lower wing. Like other pilots of the 25th Aero Squadron, Wattis had been attached to the RAF for a time before being assigned to an American unit. He served with No 84 Squadron from June through October of 1918. (Raymond C Wattis via Norman Burtl and Robert Sheldon)



(Below) Lt Guy M Baldwin in the cockpit of F8038, No 15, named 'TUNIS'. The radiator cowling and wheel covers (and probably the fin) of this aircraft were painted White. Baldwin had served with No 85 Squadron of the RAF for two months before being assigned to the 25th Aero Squadron. (Raymond C Wattis via Norman Burtl and Robert Sheldon)



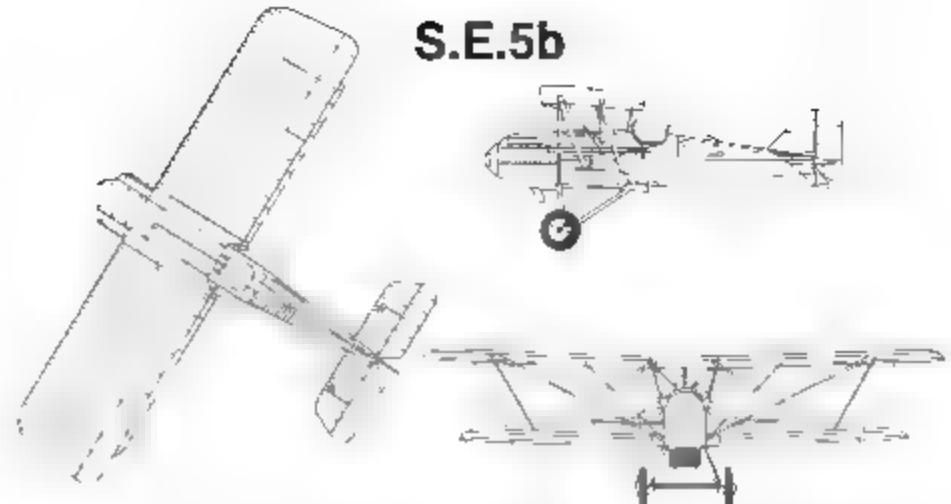
(Below) The cockpit area of a 25th Aero Squadron S.E.5a. Both an Aldis tubular eight and ring and bead eight are carried. The clear panel in the fuselage upper decking allowed light into the cockpit. The bulge over the Vickers gun breech was a feature that seems to appear only on American flown S.E.5as. (Raymond C Wattis via Norman Burtl and Robert Sheldon)



S.E.5b

Only one true development of the S.E.5a was constructed. Known as the S.E.5b, it featured longer upper wings, 30 feet 6 inches with a chord of 6 feet; shorter lower wings, 26 feet 6 inches with a chord of 4 feet 3 inches. The interplane struts had a very pronounced outward rake. A large round spinner was fitted over a two-bladed propeller that blended into a streamlined nose. Powered by a 200 hp direct drive Arles built Hispano-Suiza engine with an underslung radiator that swung backward and could be partially retracted, the S.E.5b's performance was found to be not as good as that of the S.E.5a. Unfortunately the larger upper wings created additional drag, negating the benefits of the streamlined nose and shorter lower wings. When later fitted with standard S.E.5a wings, its performance improved, but not by very much. The S.E.5b remained at Farnborough for a number of years where it was flown experimentally.

S.E.5b



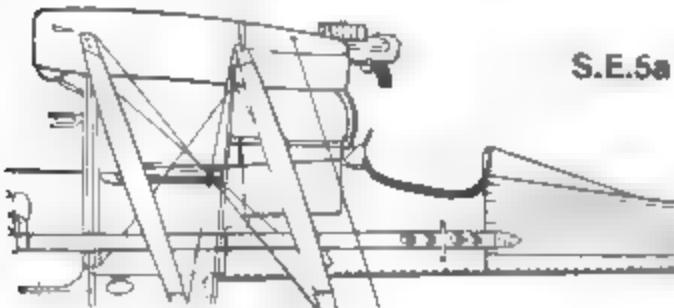
The S.E.5b was constructed at Farnborough in April of 1918. Both the streamlined nose and underslung exposed radiator can readily be seen. The serial number on the fin identifies this machine as the last of the second S.E.5 production batch and was finished as one of the initial seven S.E.5as. (John R. Carlson)



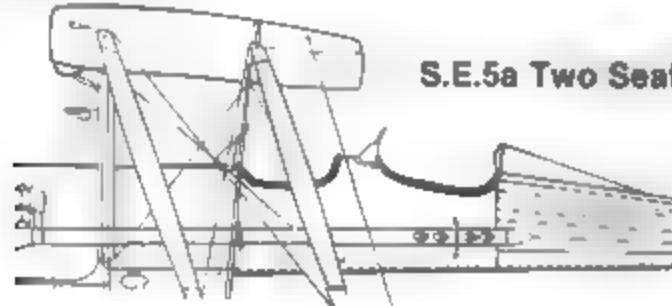
Two Seat Trainers

Several S.E.5as were modified into two seat training aircraft. The fuselage fuel tank was removed and a second cockpit installed in front of the standard cockpit. The additional pilot naturally increased the aircraft's weight and consequently its performance suffered, however the two-seated S.E.5a was still an easy aircraft to fly. The Canadians also converted some of their S.E.5as into trainers after the war.

One of the earliest two seated S.E.5as was B18, one of the first Martinsyde built aircraft. A cylindrical gravity fuel tank has been installed on center section of the upper wing. (RAF Museum)

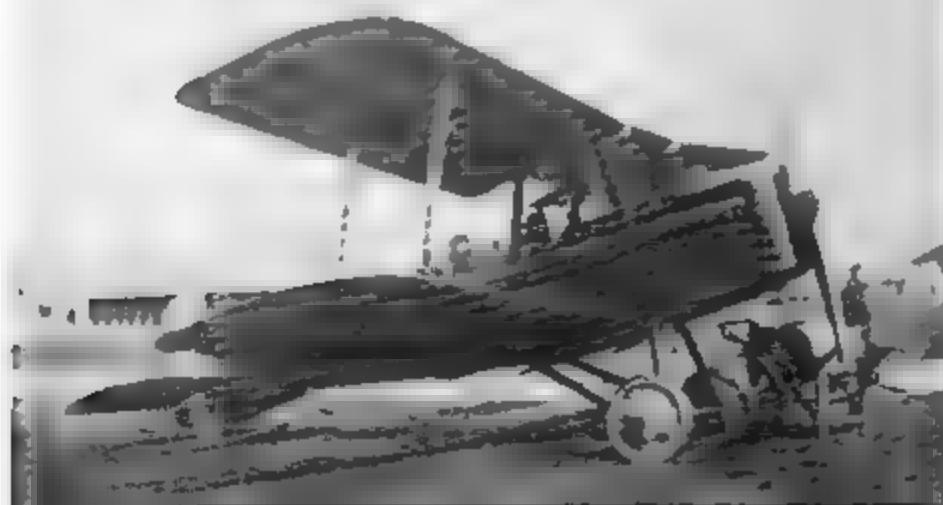


S.E.5a



S.E.5a Two Seat Trainer

Several S.E.5as were modified into two seat training aircraft by removing the fuselage fuel tank and installing a second cockpit. Although the aircraft's performance was reduced by the weight of the additional pilot, the S.E.5a was still not difficult to fly. (John R Carlson)



Postwar

After the Armistice, the S.E.5a quickly disappeared from the RAF inventory. Some remained in service for a time, but were soon replaced by the Sopwith 7F 1 Snipe. Others continued to serve for some years with the air forces of Canada, Australia, and South Africa. A few were used by the Polish Air Force in the war against Russia in 1920, and one S.E.5a was captured and flown by the Russians.

The United States seems to be the most prolific postwar user of the type. It served as a pursuit trainer with several American units during the early 1920s. In 1923-24 the Eberhardt Steel Company constructed a modified version of the S.E.5a from the parts of British built aircraft. These aircraft, designated S.E.5Es, were powered by 180 hp Wright Martin Hispano-Suiza engines, and had plywood covering applied to the flat sides of the fuselage for greater strength. Performance of the S.E.5E was considerably inferior to the wartime British S.E.5a because of the added weight of the plywood covering and the lower power rating of the Wright-Martin engine. Charles A. Lindbergh flew the S.E.5E when he was an Army Air Cadet at Brooks Field, Texas.

The S.E.5a also found civilian employment as a skywriting and film aircraft. For skywriting, the aircraft's exhaust pipes were lengthened and fused into one outlet at the tail with a portion of the rudder removed. Skywriting S.E.5as were used in both Britain and America. During the early 1930s Howard Hughes obtained several surplus S.E.5as or S.E.5Es for his motion picture epic *Hell's Angels*.

(Above Right) An S.E.5a in American service at Langley Field, Virginia, about 1924. Serialled A.S.8044. It is thought to have originally been F8044, one of the aircraft purchased by the AEF in 1918. All armament has been removed, the top decking of the forward fuselage has been rebuilt, and a non-standard windscreen has been fitted. The hand air pump has been repositioned outside the cockpit and the tires appear to be larger than standard. The color scheme is overall Olive Drab with numbers in Black outlined in White. (Fred C Dickey, Jr via Ernest R McDowell)

(Below) An overall silver S.E.5a, number 320, in post-war service with the South African Air Force. (RAF Museum)



(Below) An American pilot who had served with No 85 Squadron was Lt John C Rorison (Right, with members of his ground crew), who was with 85 Squadron from 15 June to 8 August of 1918. He flew this Wolseley built S.E.5a (D8833 N), which carried an inscription indicating that it was the fourth aircraft paid for through subscription by the citizens of Newport, Fife, Scotland. The White hexagon, No 85 Squadron, marking is carried somewhat further aft than usual and the aircraft letter has been heavily stylized with calligraphic letters. (Air Force Museum)





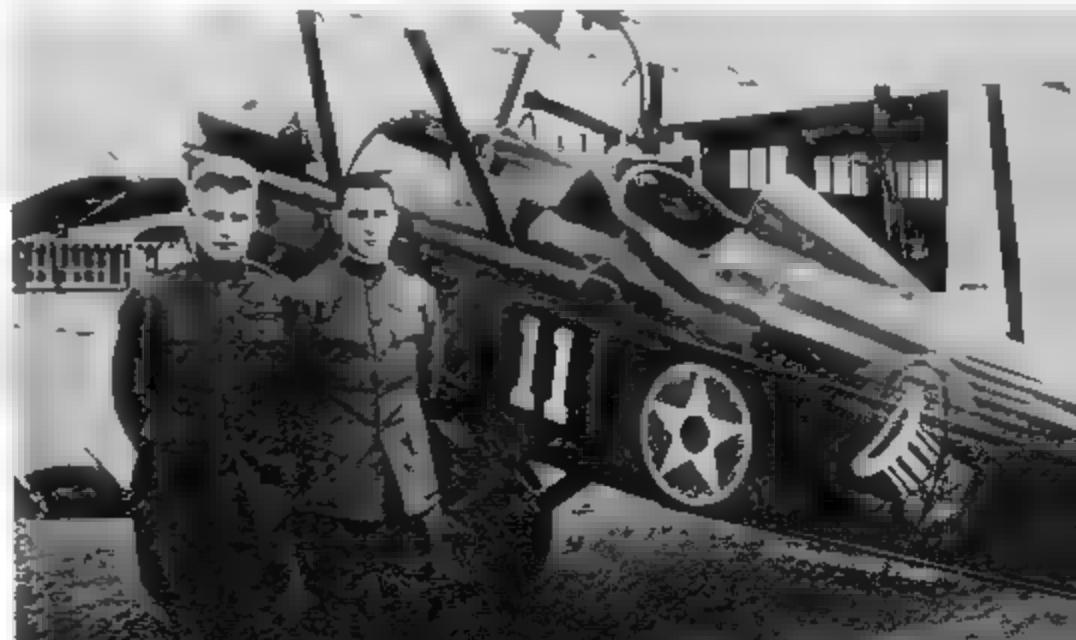
(Above) A line up of S.E.5as in United States Air Service markings at Bolling Field on 18 May 1920. All Lewis guns have been removed from the aircraft although the third aircraft still carries the Foster sliding mount. The fourth aircraft is painted overall White. (Air Force Museum)

(Below) During the 1920s the most famous American Squadron of the First World War, 'The Hat in Ring' 94th Aero Squadron, then based in Texas, was re-equipped with S.E.5as. White 5 still carries the British serial (F 8118) on the rear fuselage and tail. The metal upper cowling has been removed to provide additional cooling in the hot Texas sun. The plywood fairings have been removed from the front landing gear struts. The Lewis gun has also been removed, although the Foster mount has been retained, and the Vickers gun is still in place. (Air Force Museum)



White 13 also has had its engine cow panel and landing gear strut fairings removed, along with the Vickers machine gun. The Lewis gun, however, has been retained. The stripes on the radiator and wheels are believed to be Red and White. (Air Force Museum)

(Below) Major Reed Chambers (Left) and Captain Arthur Ray Brooks pose beside Chambers' White 11. Inside the brim of the insignia's hat are painted seven crosses denoting the seven victories that Chambers got — six aircraft and one balloon. Brooks was also an ace, attaining six victories as a member of the 22nd Aero Squadron during 1918. His Spad XIII is in the Smithsonian. (Air Force Museum)





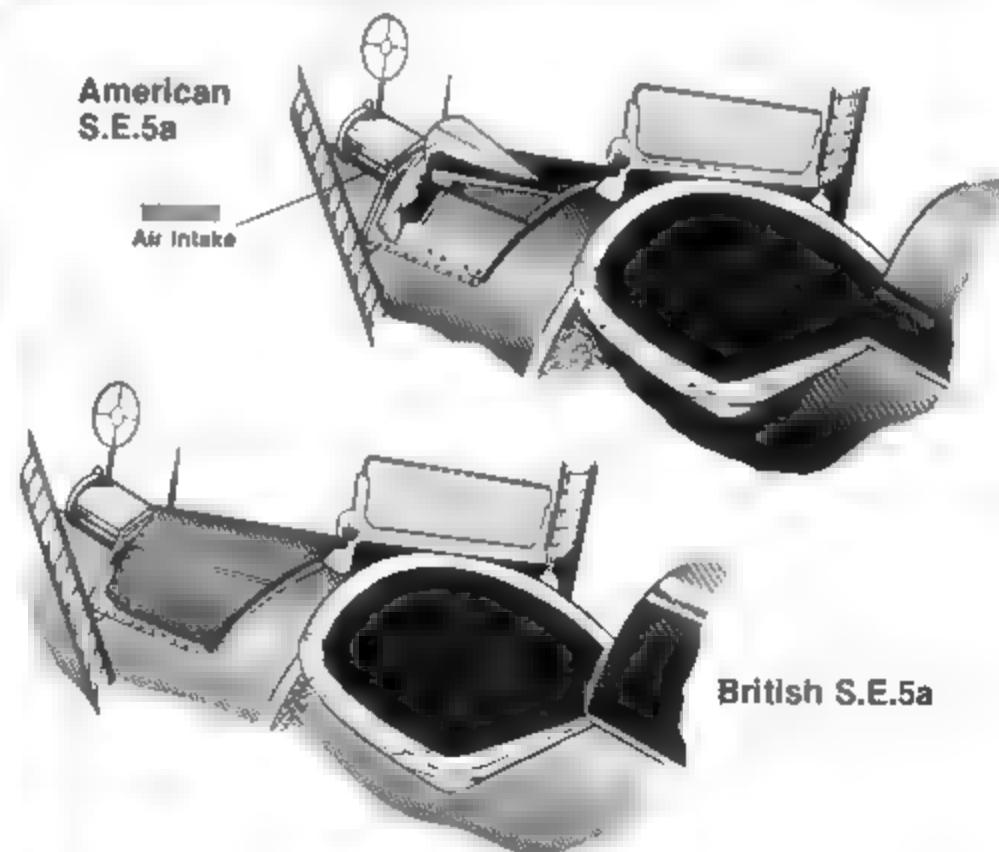
An S.E.5E Taxis at Brooks Field, Texas while a Curtiss JN-4 'Jenny' circles overhead.
(Ernest A McDowell)



(Above) 'Moxie', an S.E.5a of the 147th Aero Squadron carrying the unit's Scottie dog insignia. The aircraft number painted just below the exhaust pipe, has been over painted with Olive Drab but can be faintly seen. (Air Force Museum)



(Below) An S.E.5a of the 85th 'Kicking Mule' Squadron (F.8157) on its back after a landing accident. The location and date of the accident are unknown. (Air Force Museum)



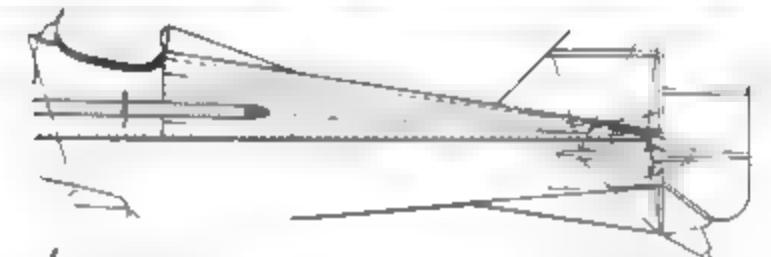


(Above) A skywriting S.E.5a carrying the British civil registration G-EBIF at the King's Cup Air Race at Hendon in July of 1928. The exhaust pipes have been lengthened and fused into a single outlet at the tail. A section of the rudder has been removed for clearance. The aircraft was painted overall Silver with Black lettering. (RAF Museum)

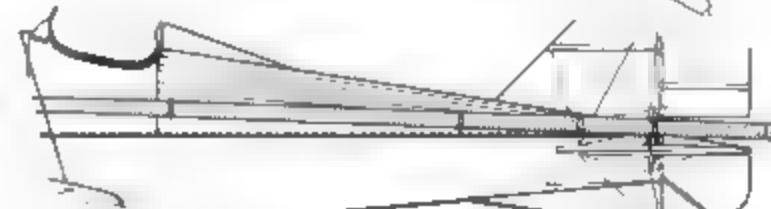
(Below) A late surviving S.E.5a at the Royal Air Force display at RAF Hendon on 26 July 1937 (RAF Museum)



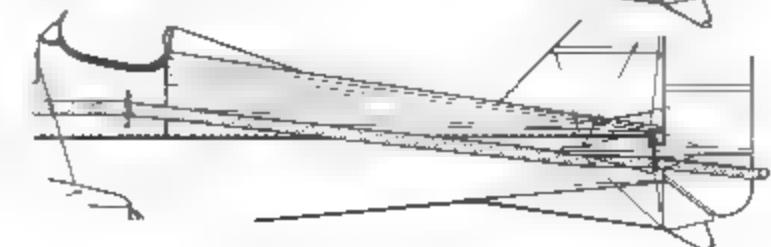
S.E.5a



S.E.5a
Skywriter



S.E.5a
Skywriter





An S.E.5E in use as a Skywriter in America, carrying the US military serial A.S.22-318. Similar to the British aircraft, the exhaust pipes have been lengthened and fused together, but below the tail plane, removing the necessity of modifying the rudder. (John R Calson)

Survivors

Six original S.E.5as are known to exist. Of the four in Britain, three of them were built by Wolseley Motors and were part of the same production batch. All of them were at one time used for skywriting. The restored F939 is on display at the Science Museum in South Kensington. F938 is beautifully restored and is on display at the RAF Museum at Hendon. The only S.E.5a now airworthy is F904, and part of the Shuttleworth Collection at Old Warden Aerodrome. The fourth S.E.5a in Britain is the property of the Honorable Patrick Lindsay, who plans to restore it to flying condition. Originally an S.E.5E, it was for many years part of the Tailmantis Movieland of the Air Collection, and appeared in motion pictures and television programs.

An S.E.5a once serialled A2-4 is housed in the Australian War Memorial Museum in Canberra. It has recently been restored to its WWI configuration.

Another former S.E.5E is owned by the National Air and Space Museum of the Smithsonian Institution, and has been displayed in an uncovered state at the Experimental Aircraft Association Museum in Wisconsin. Plans are for this aircraft to be transferred to the Air Force Museum where it is to be fully restored as an S.E.5a and placed on display.

(Below) One of four S.E.5as which still exist in Great Britain (F-938) is a Wolseley built machine. Once used as a skywriting machine, it was restored to its wartime configuration (although without armament) and placed on display at The Science Museum in South Kensington, London, where it can be seen today. (John R Carlson)



(Above) Another S.E.5a survivor is F-938. Once a part of the famous Nash collection, it is now on display at the Royal Air Force Museum at RAF Hendon. It is seen here during restoration in the RAF shops at Henlow. (RAF Museum)



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S.E.5 of No 58 Squadron and flown by Lt I H D Henderson. This aircraft was modified with a small windscreens and headrest just before No 58 Squadron was sent to France in April of 1917.

David Cawdron



S.E.5a (F8118) of the 94th Aero Squadron, United States Air Service, Austin, Texas during 1918/1920.

David Cawdron